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FAA
Commercial Space Transportation

X Prize Cup Environmental Assessment

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X Prize Cup Draft Environmental Assessment

AGENCY: Federal Aviation Administration (FAA)

ABSTRACT: In accordance with NEPA regulations, the FAA is announcing the availability of the X Prize Cup Draft Environmental Assessment (EA). Under the proposed action, the FAA would issue separate experimental permits to applicants seeking to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge at the X Prize Cup, which is to be held at the Las Cruces International Airport in New Mexico during October 2006. In addition, as part of the proposed action, the FAA would approve revisions to the Airport Layout Plan for construction activities required to support the X Prize Cup.

Potential impacts of the proposed action and alternatives were analyzed in the Draft EA, which includes an assessment of: air quality (including construction impacts), biological resources – fish, wildlife, and plants (including construction impacts), cultural resources (including historical, architectural, and archaeological resources), geology and soils, hazardous materials and hazardous waste (including solid waste, pollution prevention, and natural resources and energy supply), health and safety, land use (including Section 4(f), and farmlands), noise and compatible land use, socioeconomic impacts, environmental justice, and children's environmental health and safety risks (including secondary (induced) impacts), transportation, visual resources (including light emissions and visual impacts), and water resources (including water quality, coastal resources, wild and scenic rivers, wetlands, and floodplains). Potential cumulative impacts of the proposed action also are addressed in the Draft EA.

CONTACT INFORMATION: The notice of availability of the Draft EA was published in local papers in August 2006. The Draft EA can be downloaded from the FAA website at http://ast.faa.gov/. Questions or additional information on the Draft EA can be requested from: Ms. Stacey M. Zee, FAA Environmental Specialist, FAA X Prize Cup EA, c/o ICF International, 9300 Lee Highway, Fairfax, VA 22031; e-mail FAA-X-PrizeCupEA@ICFI.com; or fax (703) 934-3951.

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EXECUTIVE SUMMARY

Introduction

Under the proposed action, the Federal Aviation Administration (FAA) would issue experimental permits to applicants seeking to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge at the X Prize Cup, which is to be held at the Las Cruces International Airport in New Mexico during October 2006. The FAA would issue a separate experimental permit for each suborbital rocket design. In addition, as part of the proposed action, the FAA would approve revisions to the Airport Layout Plan for construction activities required to support the X Prize Cup. The decision to issue experimental permits for launch and reentry of reusable suborbital rockets by the FAA and the approval of the Airport Layout Plan revisions are considered major Federal actions; consequently, the FAA is responsible for analyzing the environmental impacts associated with permitting proposed launches and reentries and approving the Airport Layout Plan revisions as required by the National Environmental Policy Act (NEPA) of 1969.

For the purposes of this Environmental Assessment (EA), the FAA examined the environmental impacts associated with the launch activities of the suborbital rockets to make an informed decision on whether to issue experimental permits. The FAA also examined the environmental impacts associated with the revisions to the Airport Layout Plan to make an informed decision on whether to approve the Airport Layout Plan modification. The scope of the analysis in this EA is defined by activities associated with the Vertical Rocket Challenge and the Lunar Lander Challenge reusable suborbital rockets and infrastructure modifications that directly support the operation of the suborbital rockets. The flight of the "X-Racer" vehicle for the Rocket Racing League, the model rocket launches, the Tripoli amateur rocket launches, and the events associated with the Elevator Games do not require the issuance of permits or licenses by the FAA. Therefore, these activities are not included in the scope of the proposed action. Such activities are considered in the cumulative impact analysis.

Purpose

The proposed action is to issue experimental permits for the operation of reusable suborbital rockets in accordance with FAA's commercial space transportation regulations (Title 49, U.S.C., Subtitle IX, Sections 70101-70121) and to approve any revisions to the Airport Layout Plan that are required to support the X Prize Cup activities. The purpose of the proposed action is to ensure the safe and responsible operation of the reusable suborbital rockets for applicants seeking to participate in the X Prize Cup Vertical Rocket Challenge and the Lunar Lander Challenge and to implement the proposed revisions to the Airport Layout Plan in a manner consistent with the safe and efficient operation of the airport.

Need

The need for the proposed action is ensure safe commercial and general aviation activities and to accelerate the technology developments supporting the commercial creation of a vehicle capable of ferrying cargo or humans back and forth between lunar orbit and the lunar surface. Such a

vehicle would have direct application to the personal spaceflight industry as well as the technology development goals of the Defense Advanced Research Projects Agency (DARPA) and the National Aeronautics and Space Administration (NASA). In addition, the need supports NASA's mission as directed by the President to return Americans to the moon by 2020 and to use the mission as a steppingstone for future manned trips to Mars and beyond.

FAA action is necessary because of the agency's responsibilities under the provisions of Subtitle IX of Title 49 U.S.C pertaining to commercial space launch activities (Chapter 701), and Subtitle VII of Title 49 U.S.C. pertaining to airport development (Chapter 471).

Description of the Proposed Action/Preferred Alternative

Under the proposed action, which is the preferred alternative, the FAA would issue experimental permits to applicants proposing to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge, which would authorize the launch of the applicants' reusable suborbital rockets from the Las Cruces International Airport. An experimental permit is valid for one year and authorizes an applicant to conduct an unlimited number of suborbital launches from a specific location. However, the suborbital launches reviewed in this EA are associated with the Vertical Rocket Challenge and the Lunar Lander Challenge events at the X Prize Cup, and the Las Cruces International Airport would only allow the permitted applicants to test and launch their suborbital rockets for a period of one week prior to and during the X Prize Cup.

Under the proposed action, the FAA may issue up to five experimental permits for 10 vehicles. Each applicant would bring two identical vehicles to compete in both the Vertical Rocket Challenge and the Lunar Lander Challenge events. The X Prize Foundation has informed the FAA that 40 companies (potential applicants) have expressed interest in participating in the Vertical Rocket Challenge and the Lunar Lander Challenge event; however, as of June 22, 2006, the FAA had received only five applications. In addition, the FAA may issue an experimental permit to a subset of the applicants based on the results of the FAA's independent safety review, or an applicant may withdraw its application to obtain an experimental permit due to technical issues. The FAA did not analyze the impacts associated with issuing a subset of experimental permits because the impacts associated with issuing permits to a subset of the applicants would be within the range of, and expected to produce fewer impacts than, the impacts associated with issuing five experimental permits. The completion of the environmental review process does not guarantee that the FAA would issue experimental permits to the applicants. The applicants also must meet all FAA safety, risk, airspace analysis, and operation area hazard containment requirements.

Each of the proposed reusable suborbital rockets would be wingless and generally cylindrical in shape with a height from 2 to 6 meters (6.5 to 20 feet) and a diameter from 0.4 to 2.9 meters (16 inches to 9 feet). The suborbital rockets would consist of a single stage rocket with liquid propellants and would use inert gases such as helium or nitrogen to provide overpressure for the propellants. The fuel and oxidizer combinations associated with the experimental permit applications that FAA has received were used to define the range of propellants that may participate in the Vertical Rocket Challenge and the Lunar Lander Challenge. In addition, as

part of the proposed action, the FAA would approve revisions to the Airport Layout Plan that would be required to support X Prize Cup activities.

New and existing infrastructure would be used for staging, static test firing, and for launches and landings of suborbital rockets. Launches and landings for the Vertical Rocket Challenge and the Lunar Lander Challenge would take place north, east, and west of the intersection of the runways more than 1,097 meters (3,600 feet) away from the crowd line, and more than 76 meters (250 feet) away from each of the runways. Nine new launch and landing pads, a new propellant staging pad, and three new access roads would be required to support launches of reusable suborbital rockets competing in the Vertical Rocket Challenge and the Lunar Lander Challenge. Three separate operating areas of three pads each would be constructed. Two of the pads in each operating area would be flat and featureless for the Vertical Rocket Challenge, and one pad in each area would be a simulation of the lunar surface. This surface would be simulated by pouring some of the concrete at surface slopes up to seven degrees and placing rocks that are no more than a few inches in height around the pad for the Lunar Lander Challenge. All of the launch and landing pads would measure 10 meters (33 feet) in diameter and be circular or octagonal in shape, and the propellant staging pad would measure 10 meters (33 feet) by 10 meters (33 feet). All of the new pads would be coated with heat-resistant gunnite, a mixture of cement, sand, and water. The surface of the pads would be at or below the level of the runways. The existing concrete pad located south of the cross-runways would be used for static test firing. A temporary operation shelter (i.e., a steel shipping container) and a 5-kilowatt generator would be located with each set of launch and landing pads for a total of three shelters and generators. The generators would operate for up to 10 hours total during the Vertical Rocket Challenge and the Lunar Lander Challenge. In addition, the existing X-Racer propellant loading pad would be expanded from 37 square meters (400 square feet) to 149 square meters (1,600 square feet).

The access roads to each set of launch and landing pads would be graded gravel roads approximately 6 meters (20 feet) wide. The access roads would lead from an existing road to each set of three launch and landing pads and would be constructed at the same time as the pads. A total of 646 meters (2,119 feet) for an area of 3,941 square meters (42,380 square feet [<1 acre]) of new access roads would be constructed.

To reduce the fire hazard from engine exhaust, a 5-meter (16-foot) area would be cleared around each proposed launch and landing pad and a 20-meter (66-foot) wide corridor would be cleared between each set of three launch and landing pads. The pads would be spaced 100 meters (328 feet) apart for a total area of 4,440 square meters (47,652 square feet) [20 meters (66 feet) by 220 meters (722 feet)]. Brush and other vegetation would be cleared from this area and the area would be covered with light paving (runway millings) to reduce the fire hazard and the amount of dust generated by high velocity rocket engine exhaust. No new utility lines (i.e., water, electricity, communication) would be required to support the permitted reusable suborbital launch activities.

Description of Alternatives

For this EA, the FAA did not consider any other alternatives to issuing (the proposed action) or not issuing (the no action alternative) experimental permits to the applicants seeking to

participate in the Vertical Rocket Challenge and the Lunar Lander Challenge. The proposed experimental permits would be associated with the specific X Prize Cup Vertical Rocket Challenge and the Lunar Lander Challenge events to be held at the Las Cruces International Airport on October 20 through 21, 2006, and would therefore be of limited duration and applicability. In addition, the findings of the EA have documented no significant impacts that would warrant the consideration of any other alternative.

Description of No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits to the applicants seeking to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge and would not approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets from the Las Cruces International Airport and no construction activities. The nine launch and landing pads, the propellant staging pad, and access roads associated with the Vertical Rocket Challenge and the Lunar Lander Challenge would not be constructed, and the expansion of the X-Racer propellant-loading pad would not occur. Because the FAA would not issue experimental permits, the Vertical Rocket Challenge and the Lunar Lander Challenge event would not take place; however, all the remaining X Prize Cup events would occur. This would include the flights of the X-Racer; however, propellant loading would have to be performed from the existing pad.

Environmental Consequences of the Proposed Alternatives

Analysis Methodology

Twelve resource areas were considered to provide a context for understanding and assessing the potential environmental effects of the proposed action, with focus on key issues. The resource areas considered included air quality, biological resources, cultural resources, geology and soils, hazardous materials and hazardous waste, health and safety, land use, noise, socioeconomics and environmental justice, transportation, visual resources, and water resources. The Region of Influence (ROI), which describes a region that comprises the area that could be affected by the proposed action or alternatives, was also considered. The environmental consequences associated with the proposed action and the no action alternative, were analyzed within the ROI.

Environmental Impacts

Exhibit ES-1, Summary of Environmental Impacts from the Proposed Action and No Action Alternative, presents a summary of the impacts on each resource area.

Exhibit ES-1. Summary of Environmental Impacts from the Proposed Action and No Action Alternative

Resource Area	Proposed Action	No Action Alternative
Air Quality	Less than 5 tons (10,000 pounds) combined of particulate matter with a diameter less than 10 microns (PM_{10}), particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$), and fugitive dust would be emitted. The operation of the construction equipment would emit carbon monoxide (CO), PM_{10}, nitrogen oxides (NO_X), volatile organic compounds (VOCs), and sulfur oxides (SO_X), with PM_{10} and NO_X comprising the majority of the emissions. Because of the short construction period (two weeks) and limited number of construction vehicles involved in construction (excavator, grader, dump trucks, and concrete trucks), the emissions from the operation of such vehicles would be negligible. In addition, the proposed action would meet the Best Available Control Measures and erosion ordinances outlined in Doña Ana County's Natural Events Action Plan. Because all of the CO would be oxidized to carbon dioxide (CO_2), no emissions of NAAQS would be emitted by the reusable suborbital rockets. In addition, no hazardous air pollutants would be emitted by the reusable suborbital rockets. The water vapor and CO_2 that would be emitted would disperse into the atmosphere and would have no impact on air quality. The three 5-kilowatt generators that would be operating at each control shelter would emit CO, PM_{10}, NO_X, VOCs, and SO_X, with PM_{10} and NO_X comprising the majority of the emissions. The emissions associated with the generators would result in a negligible impact on air quality. The minimal emissions of the haze related pollutants associated with the proposed action (PM_{10}, $PM_{2.5}$) would have a negligible direct and indirect impact on the visibility at the designated Class I areas under the regional haze rule. (64 Fed. Reg. 35714, July 1, 1999)	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on air quality.

Resource Area	Proposed Action	No Action Alternative
Biological Resources – Fish, Wildlife, and Plants	A total of 17,353 square meters [187,624 square feet (~4 acres)] of disturbed desert scrub within the fenced-in boundary of the Las Cruces International Airport would be cleared for the purposes of the proposed action. The proposed action would have a negligible impact on the surrounding vegetation and wildlife. The vegetation is tolerant of active human disturbance associated with the active airport. The launch and landing pads would be covered with an impervious surface devoid of vegetation, and the area immediately surrounding the launch and landing pads, as well as the area between the launch and landing pads would be cleared of vegetation. The wildlife species that exist are tolerant of the disturbances (e.g., noise, aircraft, and vehicular movements) and would avoid active construction areas. Adverse effects to birds protected under the Migratory Bird Treaty Act would not be likely to occur. No known state or federally listed threatened or endangered species would be impacted by the proposed action. The area affected by the proposed action would not affect suitable habitat or designated critical habitat for any federally listed threatened or endangered species.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on biological resources.
Cultural Resources (including Historic, Architectural, and Archeological Resources)	The ground-disturbing activities associated with the proposed action would occur within the fenced boundary of the Las Cruces International Airport. FAA would ensure that the X Prize Foundation would survey all construction areas, access roads, and equipment staging areas and access points that are not located on existing parking areas or access points. FAA would submit the results of the survey to the SHPO, and where possible, all potential historic properties identified would be avoided by relocating a pad or access road. FAA will include this information in the results submitted to the SHPO, and will not complete its NEPA process until obtaining the SHPO's concurrence on FAA's determination that there would be no adverse effects to listed or eligible properties or other cultural resources.	Under the no action alternative, the FAA would not issue any experimental permit or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on cultural resources.

Resource Area	Proposed Action	No Action Alternative
Geology and Soils	The proposed launch, landing, and propellant staging pads would not be anchored into the bedrock; therefore geology would not be impacted. The short-term impacts of pad construction would include the potential for increased erosion during construction, while the long-term soil impacts would include compaction and mixing of soil horizons. The short- and long-term impacts on soil from construction would be negligible. Best Management Practices as promoted by the New Mexico Water Quality Control Commission would be followed (e.g., the use of silt fences, check dams, and earthen dikes) to reduce sedimentation of surface waters and reduce soil erosion. Potential propellant spills and releases represent a potential impact on soils in the form of soil contamination. Because all spills and releases would be small, based on the capacity of the reusable suborbital rockets, and would be immediately contained, removed, and remediated by trained personnel, such impacts would be considered negligible.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on geology or soils.
Hazardous Materials and Hazardous Waste Management (including Solid Waste, Pollution Prevention, and Natural Resources and Energy Supply)	During pre-flight activities, minor amounts of other hazardous materials, such as oils, lubricants, and solvents, would be used to prepare the rockets for flight. All hazardous materials would be handled, stored, and used in compliance with all applicable regulations. Hazardous materials that would be used under the proposed action are similar to materials already handled at the Airport. The transport, use, or disposal of hazardous materials associated with operations under the proposed action would not pose a substantial hazard to the public or the environment. Fuels and oxidizers would be stored in separate, secured containers in covered airport hangars. During the Vertical Rocket Challenge and Lunar Lander Challenge events, applicant-specific propellant trucks would leave the storage area and proceed to the launch/landing pad area and remain there (at a safe distance) and would return to the storage area after the applicant completes the event. If there were a spill, the applicant's personnel would be responsible for any necessary containment, removal, and remediation following a spill. In addition, emergency response and the local fire department would be on standby during the X Prize Cup to respond to accidents or fires.	Under the no action alternative, the FAA would not issue any experimental permit or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no hazardous waste or hazardous material management impacts.

Resource Area	Proposed Action	No Action Alternative
Health and Safety	Implementation of the proposed action would result in a negligible impact on health and safety. All transport of hazardous materials, including fuels and oxidizers, would be in Department of Transportation (DOT) approved packages and containers and all transportation would meet all applicable and relevant DOT Hazardous Material Regulations (49 CFR Parts 171 to 177). Trained ground crew personnel would follow established standard operating procedures during fueling operations in accordance with all applicable safety regulations. Spills of hazardous materials would be handled by trained ground crew personnel. An emergency response team would be available should it be necessary during a release or spill incident. The location of the public spectator area would be located more than 1 kilometer (3,281 feet) from the nearest set of launch and landing pads, and would be the safety zone, designated to contain the effects of a failed operation. Each reusable suborbital rocket would have an autonomous and human-controlled termination system that would be activated should the vehicle leave the designated operational area, preventing any errant suborbital rockets, debris, or failed operations from reaching the spectator area. In addition, the vehicle operators would be located in a portable steel shelter (safety bunker) located near each set of launch and landing pads. Emergency response and the local fire department would be on standby during each launch to respond to accidents or fires.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no health and safety impacts.
Land Use (including Department of Transportation 4(f) Resources and Farmlands)	The proposed action would have no effect on the existing land use at the airport or surrounding the airport. Implementation of the proposed action would not require the use or alteration of any land protected under Section 4(f) of the Department of Transportation Act or under the Farmland Protection Policy Act.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no land use impacts.

Resource Area	Proposed Action	No Action Alternative
Noise and Compatible Land Use	The operation of the rocket engines would result in short-term increases in the level of noise at the Las Cruces International Airport above the peak levels associated with the fix- and rotary-wing aircraft stationed at the airport. Other than the spectators and the airport employees, there are no sensitive noise receptors near the airport. Because the location of the launch and landing pads would be more than 1 kilometer (3,281 feet) away from the spectators and administrative area of the Las Cruces International Airport and the rocket engines would only operate for brief periods of time (up to 4 minutes), the elevated levels of noise would not be expected to adversely affect spectators or employees. The proposed action would not result in an increase in noise in excess of the applicable thresholds of significance for noise or land use compatibility.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no noise impacts.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks (including Secondary (Induced) Impacts)	The proposed action would create an influx of no more than 25,000 people for the entire two-day X Prize Cup, with no more than 13,000 people per day in attendance. Approximately 230 employees would be required to host the X Prize Cup, and approximately 250 exhibitors would attend the event. Doña Ana County would experience positive impacts to socioeconomics. The additional services provided to the spectators and personnel would provide a temporary benefit to the local economy because of the increase in the amount of business conducted by the service industry, such as hotels, restaurants, and gas stations. The temporary increase in the local population would not exceed the service capacity of the region in terms of lodging or services (public utilities or emergency care). Because, Doña Ana County has a zoning ordinance that restricts residential development within a 4-kilometer (2.5-mile) radius of the Las Cruces International Airport, there would be no adverse impacts on socioeconomics, environmental justice populations or on children's health and safety by the proposed action. (Las Cruces International Airport, 1997) Because the proposed action does not involve major development, it would not involve the potential for induced or secondary impacts on surrounding communities.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no socioeconomic impacts.

Resource Area	Proposed Action	No Action Alternative
Transportation	Under the proposed action, the influx of up to 13,000 spectators would result in increases in traffic congestion on the local roadways around the Las Cruces International Airport; however, there would be no notable travel delays associated with travel on the Interstate Highways (I-10 and I-15). The range of average daily traffic on the Interstates (5,000 to 18,000 passenger cars and trucks per day) and the increase in traffic associated with the spectators may result in a change in interstate level of service from level A to level B, which is a change from a free flow condition where individual users are unaffected by the presence of others in the traffic stream to a stable traffic stream where individual users begin to notice others. Such a change would be a negligible change in the traffic flow on I-10.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no transportation impacts.
Visual Resources	Implementation of the proposed action would result in no change to the visual resources associated with the Las Cruces International Airport. The reusable suborbital launch vehicles would remain within 200 meters (656 feet) of the ground, would be similar in size to fix-wing and rotary-wing aircraft that operate out of the airport, and any emission clouds would disperse within a short period of time.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no visual resource impacts.
Water Resources	Implementation of the proposed action would have no impact on water resources. No streams, wetlands, or floodplains are located within the proposed operational area of the reusable suborbital rockets, which includes the location of all the proposed launch and landing pads. In addition, existing municipal water supply sources would be used for all the X Prize Cup activities.	Under the no action alternative, the FAA would not issue any experimental permits or approve the Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on water resources.

Cumulative Impacts of the Proposed Alternatives

For this analysis, cumulative impacts include impacts from the permitted vehicles that would participate in the Vertical Launch Challenge and the Lunar Landing Challenge events and the past, present, and reasonably foreseeable future activities that would affect the resources impacted by the events at the Las Cruces International Airport. The FAA also reviewed the projects found on the City of Las Cruces Planning Department web page, http://www.las-cruces.org/cd/planning_services-default.shtm, and found that no projects are planned in the immediate vicinity of the Las Cruces International Airport. The past, present, and reasonably foreseeable future activities reviewed by the FAA include the X Prize Cup events that would occur as discussed below.

The X-Racer will fly up to four times per day during the two-day X Prize Cup. The rocket motor propellants for the X-Racer consist of LOX and kerosene and have a burn time of about four minutes. In addition, the existing X-Racer propellant loading pad would be expanded from 37 square meters (400 square feet) to 149 square meters (1,600 square feet). Up to 12 launches of six amateur rockets will occur throughout the two-day X Prize Cup. The amateur rockets (Tripoli rockets) do not require a license or permit from the FAA. A 10-meter (33-foot) diameter (circular or octagonal) launch area would be located on an existing road for the amateur (Tripoli) launches. The amateur rocket recovery area will be on land managed by the Bureau of Land Management (BLM); the X Prize Foundation will obtain authorization from BLM to use the recovery area.

Up to six different rocket engines will be fired at the existing static rocket engine test pad. Each rocket engine may be fired two times each day for up to 30 seconds each, for a total rocket engine operating time of six minutes.

Up to 1,000 model rockets will be launched either at or adjacent to the Las Cruces International Airport. The location and layout of the model rocket launches will be large enough and designed to accommodate the recovery of the model rockets (i.e., a separate recovery area would not be required).

The rocket truck will be provided by Orion Propulsion, which consists of a 2,000 pound-thrust hybrid rocket engine fueled by nitrous oxide and asphalt mounted in the bed of a pick-up truck.

The Elevator Games would include a cable tensile strength competition, where competitors provide a segment of cable that is tested and the cable with the highest tensile strength wins the competition. In addition, the Elevator Games would include a rope-climbing event in which a remotely powered climbing vehicle ascends a 61-meter (200-foot) rope suspended by a crane. The power for the climbing vehicle is provided from a microwave or laser beam directed at the climbing vehicle. The climbing vehicle that ascends the rope the fastest wins the competition.

Because limited parking is available at the Las Cruces International Airport, additional offsite parking may be available at the Southern New Mexico State Fairgrounds located approximately 3.2 kilometers (2 miles) west of the airport off I-10. Shuttle service will be provided between the fairgrounds and the airport.

FAA reviewed the activities associated with the proposed action to identify the resources that may be notably affected by the implementation of the proposed action and then assessed the impacts from the other past, present, and reasonably foreseeable future activities that may impact the same resources. FAA found that the proposed action may have a less than significant impact on

- Air Quality,
- Biological Resources, or
- Health and Safety.

For the other resource areas, the impacts were found to be negligible or non-existent and would not result in a cumulative impact when assessed with other past, present, and reasonably foreseeable future activities.

Cumulative Impacts on Air Quality

In addition to the air quality impacts discussed under the proposed action, the other X Prize Cup activities would result in emissions of criteria air pollutants, Hazardous Air Pollutants (air toxics), and air pollutants regulated by New Mexico. The X-Racer rocket engine operation, the operation of rocket motors with solid propellant (the amateur rockets), the static firing of rocket engines, the operation of the rocket powered truck, and up to 1,000 launches of model rockets would emit water, carbon dioxide, and criteria air pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_X, SO_X, and CO). In addition, the operation of the amateur rockets would result in emissions of hydrogen chloride and aluminum oxide. Hydrogen chloride is a Hazardous Air Pollutant regulated by the U.S. Environmental Protection Agency, and aluminum oxide is a toxic air pollutant regulated by New Mexico per 20.2.72 New Mexico Administrative Code Section 402.B.

The cumulative total emissions of any individual criteria pollutant (i.e., CO, PM_{10}, NO_X, VOCs, and SO_X) would be less than 2 tons (4,000 pounds), which would readily disperse resulting in a negligible cumulative impact on regional air quality. Because the emissions of aluminum oxide and hydrogen chloride would be from the amateur rockets that would be launched from a temporary launch pad, the emissions would not be generated from a regulated source, and, therefore would not be subject to U.S. Environmental Protection Agency (EPA) or New Mexico regulations. However, the emissions of hydrogen chloride and aluminum oxide would be up to 0.93 kilograms (2.04 pounds) and 1.68 kilograms (3.7 pounds), respectively, per launch. This amount of emissions would be from ground level up to approximately 914 meters (3,000 feet) above ground level and would readily disperse. Because a maximum of 12 launches of amateur rockets would occur over a two-day period and the amount of hydrogen chloride and aluminum oxide emitted would be small and would readily disperse, the impact on the regional air quality would be negligible.

The cumulative impact of the emissions of all the activities occurring at the X Prize Cup would be negligible. The reusable suborbital rockets and the rocket engines that would be operated on the test stand would use similar types of propellants resulting in emissions of water and CO_2; however, the total amount would be less than double that from the proposed action because the

number of static firings and the duration would be less than the number and duration of the rocket engine operations during the Vertical Launch Challenge and the Lunar Lander Challenge. In addition, the operation of the static test stand, the Vertical Launch Challenge, and the Lunar Lander Challenge would not occur at the same time; therefore, the emissions from one event would dissipate prior to the initiation of the next event and a new emission source.

Cumulative Impacts on Biological Resources

The X-Racer would take off from an existing runway and would maintain a flight plan typical of a fixed-wing aircraft operating from the airport and would not represent a new impact on the existing biological resources. The rocket truck would operate along the existing apron or runway and would not represent a new impact on the existing biological resources. The static testing of rocket engines would occur from an existing test pad and would not represent a new impact on the existing biological resources. The amateur rocket launches would occur from a temporary launch pad placed on an existing road, and the X Prize Foundation is in consultation with the BLM to obtain the appropriate land use permit for a rocket recovery area and access to the area. The landing of the amateur rockets and the off-road access to the landing area would result in a negligible short-term impact on vegetation and wildlife in the area. The launch of model rockets would occur in a cleared area suitable for launch and recovery and would not impact vegetation or wildlife. These activities would result in a negligible cumulative impact on biological resources.

Cumulative Impacts on Health and Safety

Because the same transportation and operation measures associated with the proposed action would be implemented for the other activities occurring during the X Prize Cup, there would be no additional cumulative health and safety impacts. In addition, for the elevator games that involve the use of a laser or microwave beam, the beam would be directed at a specific target away from the spectators or any sensitive receptors; therefore, there would no cumulative health and safety impact.

Cumulative Impacts on Land Use

Existing cleared areas at the airport or adjacent to the airport will be used for the launch and recovery of the model rockets. These actions would have no cumulative effect on the existing land use at the airport or surrounding the airport. The X Prize Foundation must obtain written authorization from the BLM to use and access BLM land for the landing and recovery of the amateur rockets.

Mitigation

The environmental impact analysis in this EA found no impacts in excess of applicable thresholds of significance for any impact category. Therefore, no mitigation is necessary. However, to ensure the health and safety of participants, spectators, and airport staff, the FAA recommends that the X Prize Foundation implement the following noise protection measures and monitoring during the X Prize Cup:

- Post noise information posters that inform the public spectators of the potential noise hazards.
- Ensure that noise protection devices (e.g., ear plugs) would be available during the X Prize Cup.
- Monitor the level of noise at the perimeter of the spectator area during rocket engine operation.
- Provide noise monitoring summary report to the FAA to include the activity(ies), location(s), duration, date, time of day, weather condition, and recorded noise level in "A" weighted decibels (dBA).

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Table of Exhibits

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ACRONYMS AND ABBREVIATIONS

AALP	Armadillo Aerospace Large Prototype
APE	Area of Potential Effects
ARTCC	Air Route Traffic Control Center
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon monoxide
CWA	Clean Water Act
DARPA	Defense Advanced Research Projects Agency
dB	Decibels
DOT	Department of Transportation
EA	Environmental Assessment
EPA	Environmental Protection Agency
EO	Executive Order
FAA	Federal Aviation Administration
FPPA	Farmland Protection Policy Act
HAPs	Hazardous Air Pollutants
DNL	Day-night average sound level
LCFD	City of Las Cruces Fire Department
Leq24H	Average sound level over an entire day
LLAQ	Lunar Lander Analog Quad
LOX	Liquid oxygen
MPO	Metropolitan Planning Organization
$\mu g/m^3$	micrograms per cubic meter
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
National Register	National Register of Historic Places
NEAP	Natural Events Action Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
Pb	Lead
$PM_{2.5}$	Particulate Matter with diamter 2.5 microns or less
PM_{10}	Particulate Matter with diameter 10 microns or less
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence

SIP	State Implementation Plan
SO_2	Sulfur dioxide
SO_X	Sulfur oxides
TSCA	Toxic Substances Control Act
USFWS	United States Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WRAP	Western Regional Air Partnership

1 INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA) as amended (42 United States Code [U.S.C.] 4321, *et seq*.), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1598), Federal Aviation Administration (FAA) Order 1050.1 E, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, *NEPA Implementation Instructions for Airport Action* direct FAA lead agency officials to consider the environmental consequences when planning for, authorizing, and approving Federal actions. Issuing experimental permits and approving a revision to the Airport Layout Plan are considered major Federal actions that are subject to review as required by NEPA. Accordingly, the FAA prepared this Environmental Assessment (EA) to evaluate the potential environmental impacts of activities associated with issuing multiple experimental permits in support of the X Prize Cup hosted by the X Prize Foundation and the State of New Mexico as well as approving necessary revisions to the Airport Layout Plan.

1.1 Background

This EA evaluates the potential environmental impacts associated with the issuance of experimental permits to current and potential applicants that may participate in the Vertical Rocket Challenge and the Lunar Lander Challenge at the 2006 X Prize Cup. The Vertical Rocket Challenge is funded by the Defense Advanced Research Projects Agency (DARPA) and the Lunar Lander Challenge is funded by the National Aeronautics and Space Administration (NASA), but both will be managed by the X Prize Foundation. Teams competing in the Vertical Rocket Challenge and the Lunar Lander Challenge will compete to win prizes totaling $2,500,000. The X Prize Cup will be held at the Las Cruces International Airport in New Mexico October 20 through 21, 2006. Contestants may arrive at the airport up to one week prior to the X Prize Cup event to set up and test their reusable suborbital rockets. If five or more vehicles are considered eligible to compete in the Vertical Rocket Challenge or the Lunar Lander Challenge, the X Prize Foundation would perform a qualifying run of both events and select up to four vehicles to compete in each. This EA also evaluates the approval of any revisions to the Airport Layout Plan that are required to support the X Prize Cup activities.

In addition to the Vertical Rocket Challenge and the Lunar Lander Challenge, the X Prize Cup will feature flights of the X-Racer rocket powered airplane for the Rocket Racing League (a rocket powered airplane operating under an FAA Experimental Airworthiness Certificate), up to 1,000 model rocket launches, up to 12 launches of six amateur rockets[1] (Tripoli rockets operating under FAA Part 101 airspace waivers), static test firing of up to six rocket engines, the Elevator Games[2], and exhibition runs of a rocket powered truck along the apron or the closed runway.

[1] Amateur rocket activities means launch activities conducted at private sites involving rockets powered by a motor or motors having a total impulse of 200,000 pound-seconds or less and a total burning or operating time of less than 15 seconds, and a rocket having a ballistic coefficient, i.e., gross weight in pounds divided by frontal area of rocket vehicle- less than 12 pounds per square inch. (14 CFR Part 401.5)

[2] The Elevator Games would include a cable tensile strength competition, where competitors provide a segment of cable that is tested and the cable with the highest tensile strength wins the competition. In addition, the Elevator Games would include a rope-climbing event in which a remotely powered climbing vehicle ascends a 61-meter

Based on the attendance in 2005, the X Prize Foundation anticipates that the total attendance for the X Prize Cup could be 25,000 people with a maximum of 10,000 at any one time. Limited parking is available at the Las Cruces International Airport; therefore, off-site parking and a shuttle service will be used.

1.2 Purpose and Need

Purpose

The proposed action is to issue experimental permits for the operation of reusable suborbital rockets in accordance with the Commercial Space Launch Act of 1984 (CSLA), the Commercial Space Transportation Competition Act of 2000 (CSTCA), Title 49, U.S.C., Subtitle IX, Sections 70101-70121, and FAA's commercial space transportation regulations 14 CFR Parts 400-450, and to approve any revisions to the Airport Layout Plan that are required to support the X Prize Cup activities. The purpose of the proposed action is to ensure the safe and responsible operation of the reusable suborbital rockets for applicants seeking to participate in the X Prize Cup Vertical Rocket Challenge and the Lunar Lander Challenge, and verify that implementation of the proposed revisions to the Airport Layout Plan would be consistent with the safe and efficient operation of the airport.

The purpose of FAA action in connection with issuance of experimental permits is to ensure compliance with international obligations of the United States and to protect the public health and safety, safety of property, and national security and foreign policy interest of the United States during commercial launch or reentry activities; to encourage, facilitate, and promote commercial space launches and re-entries by the private sector; and to facilitate the strengthening and expansion of the United States space transportation infrastructure, in accordance with the requirements of the CSLA, the CSTCA, Executive Order (EO) 12465, 14 CFR Parts 400-450, the National Space Transportation Policy, and the National Space Policy.

The purpose of FAA action in connection with the proposed Airport Layout Plan revisions is to ensure that the proposed alterations to the airport do not adversely affect the safety, utility, or efficiency of the airport.

Need

The need for the proposed action is to ensure safe commercial and general aviation activities and to accelerate the technology developments supporting the commercial creation of a vehicle capable of ferrying cargo or humans back and forth between lunar orbit and the lunar surface. Such a vehicle would have direct application to the personal spaceflight industry as well as the technology development goals of DARPA and NASA. In addition, the need supports NASA's mission as directed by the President to return Americans to the moon by 2020 and to use the mission as a steppingstone for future manned trips to Mars and beyond.

(200-foot) rope suspended by a crane. The power for the climbing vehicle is provided from a microwave or laser beam directed at the climbing vehicle. The climbing vehicle that ascends the rope the fastest wins the competition.

FAA action is necessary in connection with the issuance of experimental permits because the Secretary of Transportation has assigned the FAA Associate Administrator for Commercial Space Transportation (AST) responsibility for oversight of commercial space launch activities, including issuance of experimental permits.

FAA action is necessary in connection with the proposed Airport Layout Plan revisions because, pursuant to 49 USC § 47107(a)(16), the FAA Administrator (under authority delegated from the Secretary of Transportation) must approve any revision or modification to an Airport Layout Plan before the revision or modification takes effect. The Administrator's approval includes a determination that the proposed alterations to the airport, reflected in the ALP revision or modification, do not affect adversely the safety, utility, or efficiency of the airport.

1.3 Scope of the Proposed Action

The scope of the proposed action is defined by activities associated with the issuance of the experimental permits, specifically the Vertical Rocket Challenge and the Lunar Lander Challenge suborbital launch activities regulated by FAA under Title 49, U.S.C., Subtitle IX, Sections 70101-70121, as well as the activities associated with the approval of any revisions to the Airport Layout Plan that are required to support the X Prize Cup activities. The flight of the X-Racer vehicle for the Rocket Racing League, the model rocket launches, and the Tripoli amateur rocket launches, as well as the events associated with the Elevator Games, do not require the issuance of permits or licenses by the FAA, and would take place whether or not the experimental permits are issued. Therefore, these activities are not included in the scope of the proposed action. The scope is further defined by activities associated with the Vertical Rocket Challenge and the Lunar Lander Challenge reusable suborbital rocket launches and infrastructure modifications that directly support the operation of the suborbital rockets.

Activities associated with the reusable suborbital rockets participating in the Vertical Rocket Challenge and the Lunar Lander Challenge include

- Preparation of the suborbital rocket,
- Pre-flight ground operations,
- Static firing tests
- Tethered launches
- Untethered vertical launch and flight,
- Powered descent and landing, and
- Vehicle safing.

Several infrastructure modifications at the Las Cruces International Airport that would support the operation of the reusable suborbital rockets also are included in the scope of the proposed action. Such modifications include

- Construction of new launch and landing pads,
- Construction of a propellant staging pad,
- Implementation of fire prevention measures (ground clearing), and
- Construction of access roads.

The approval of any revisions to the Airport Layout Plan includes the infrastructure modifications associated with the experimental permits as well as the proposed expansion of the X-Racer fueling pad located adjacent to the airport apron.

1.4 Public Involvement

The CEQ regulations for implementing NEPA (40 CFR 1506.6) describe the public involvement requirements for agencies. Public participation in the NEPA process not only provides for and encourages open communication between the FAA and the public, but also promotes better decision-making. FAA has announced the availability of the EA in the Las Cruces Sun-News and the El Paso Times, has provided copies to the Thomas Branigan Memorial Library, has posted the EA on FAA's web site, http://ast.faa.gov/lrra/comp_coop.htm, and has distributed the draft EA to the parties listed in Section 7 of this document.

The public comment period on the draft EA ends on September 14, 2006, 30 days after the public announcement and public availability. Questions or comments on the draft EA can be addressed to Ms. Stacey M. Zee, FAA Environmental Specialist, FAA X Prize Cup EA, c/o ICF International, 9300 Lee Highway, Fairfax, VA 22031; e-mail FAA-X-PrizeCupEA@ICFI.com; or fax (703) 934-3951.

1.5 Outline of the Environmental Assessment

Section 2 provides a description of the proposed action and alternatives, including the no action alternative. Section 3 discusses the affected environment by presenting a description of the baseline conditions of the potentially affected resources, e.g., air quality, at the Las Cruces International Airport. Section 4 discusses and compares the reasonably foreseeable environmental consequences of each alternative, as well as the cumulative impacts. Sections 5, 6, 7, 8, and 9 present mitigation measures, a list of agencies contacted, references, list of preparers, and the distribution list, respectively. Appendix A provides detailed information on each applicant's reusable suborbital rocket and Appendix B includes regulatory agency consultations.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

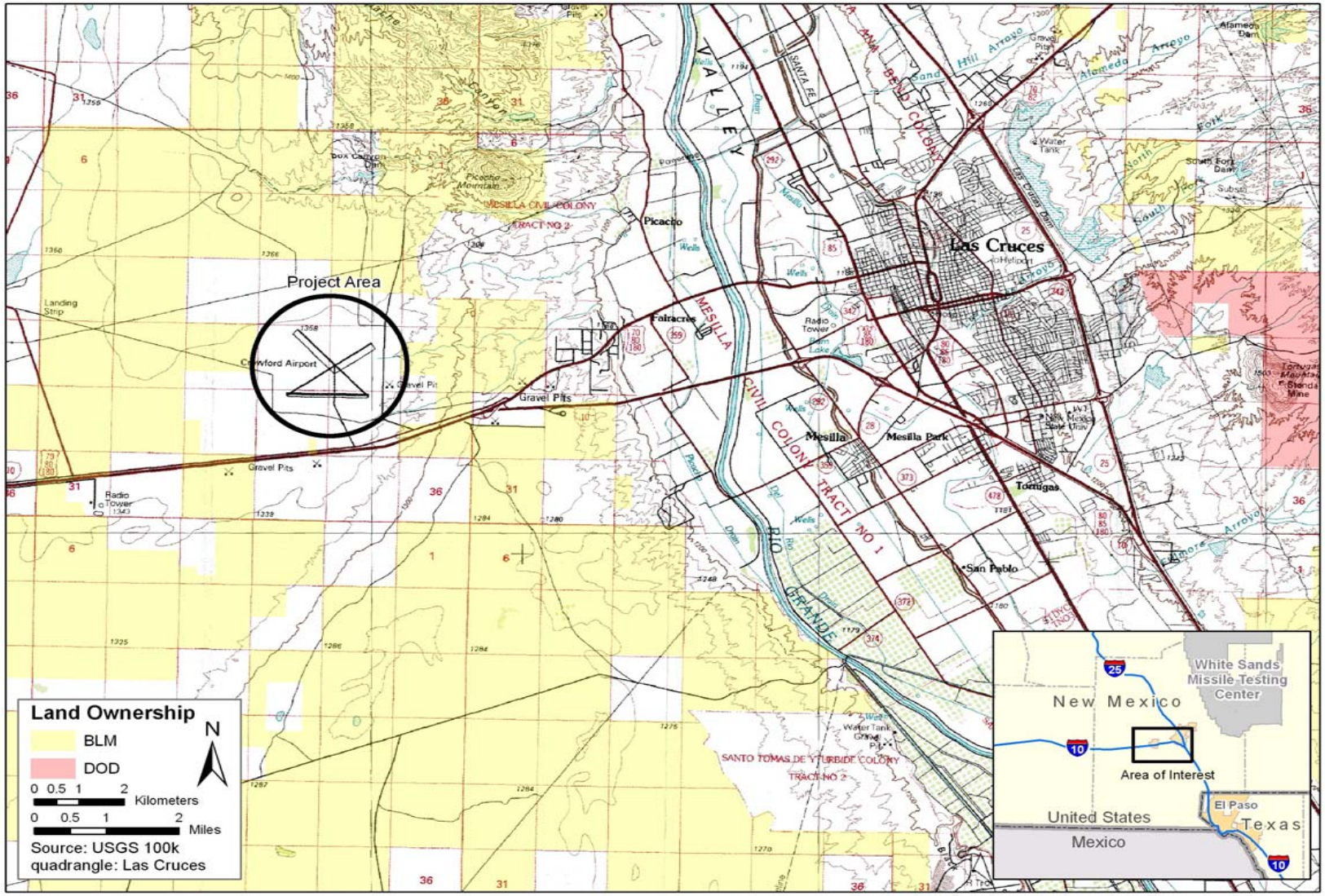
Under the proposed action, which is the preferred alternative, the FAA would issue experimental permits to applicants proposing to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge, which would authorize the launch of the applicants' reusable suborbital rockets from the Las Cruces International Airport (see Exhibit 2-1). An experimental permit is valid for one year and authorizes an applicant to conduct an unlimited number of suborbital launches from a specific location. However, the suborbital launches reviewed in this EA are associated with the Vertical Rocket Challenge and the Lunar Lander Challenge events at the X Prize Cup, and the Las Cruces International Airport would only allow the permitted applicants to test and launch their suborbital rockets for a period of one week prior to and during the X Prize Cup.[3]

Under the proposed action, FAA may issue up to five experimental permits for 10 vehicles. Each applicant would bring two identical vehicles to compete in both the Vertical Rocket Challenge and the Lunar Lander Challenge events. The X Prize Foundation has informed the FAA that 40 companies (potential applicants) have expressed interest in participating in the Vertical Rocket Challenge and the Lunar Lander Challenge event; however, as of June 22, 2006, FAA had received only five applications. In addition, FAA may issue an experimental permit to a subset of the applicants based on the results of FAA's independent safety review, or an applicant may withdraw its application to obtain an experimental permit due to technical issues. FAA did not analyze the impacts associated with issuing a subset of experimental permits because the impacts associated with issuing permits to a subset of the applicants would be within the range and expected to produce fewer impacts than the impacts associated with issuing five experimental permits. The completion of the environmental review process does not guarantee that the FAA would issue experimental permits to the applicants. The applicants also must meet all FAA safety, risk, airspace analysis, and operation area hazard containment requirements. In addition, as part of the proposed action, the FAA would approve revisions to the Airport Layout Plan that would be required to support X Prize Cup activities.

The following sections describe the activities associated with the launch of reusable suborbital rockets and the infrastructure modifications required at the Las Cruces International Airport that would result in a change to the Airport Layout Plan.

[3] The flight of the X-Racer vehicles for the Rocket Racing League will operate under an FAA Experimental Airworthiness Certificate and the Tripoli amateur rocket launches will be conducted under an FAA Part 101 airspace waiver. The Estes model rocket launches and the events associated with the Elevator Games do not require permits or licenses from the FAA.

Exhibit 2-1. Location Map



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2.1.1 Reusable Suborbital Rocket Launch

A reusable suborbital rocket launch is described by the following activities.

- Preparation of the suborbital rocket
- Pre-flight ground operations
- Vertical launch
- Attainment of intended altitude and flight/hover
- Powered descent
- Vertical landing
- Vehicle safing

The preparation of a reusable suborbital rocket would begin with its arrival at Las Cruces International Airport up to one week before the Vertical Rocket Challenge and the Lunar Lander Challenge events. Various types of ground support equipment would be used to support the suborbital rockets. Dollies and a forklift and/or a crane would be used to transfer the suborbital rocket from the transporter (typically a truck) to a staging area, test pad, or launch pad. Trailers or pick-up trucks and a commercial tank truck would be used to transport the propellants from the propellant storage area to the test or launch site. A ground crew of up to nine people would perform and supervise all pre-flight, flight, and landing operations and would be trained in the operating protocol for Las Cruces International Airport and the Vertical Rocket Challenge and the Lunar Lander Challenge events. Test support equipment would be limited to laptop computers and radio transceivers.

Each of the proposed reusable suborbital rockets would be wingless and generally cylindrical in shape with a height from 2 to 6 meters (6.5 to 20 feet) and a diameter from 0.4 to 2.9 meters (16 inches to 9 feet). The suborbital rockets would consist of a single stage rocket with liquid propellants and would use inert gases such as helium or nitrogen to provide overpressure for the propellants. The fuel and oxidizer combinations (see Exhibit 2-2) associated with the experimental permit applications that FAA has received were used to define the range of propellants that may participate in the Vertical Rocket Challenge and the Lunar Lander Challenge. Exhibit 2-2 provides a summary of the propellants, capacities, and propellant consumption rates associated with the potential reusable suborbital rockets.

Exhibit 2-2. Summary of Reusable Suborbital Rockets

Applicant	Potential Propellants (fuel and oxidizer combination)	Quantity, in kilograms (pounds)	Consumption Rate,[2] in kilograms per second (pounds per second)
Acuity Technologies[1]	70% Hydrogen peroxide	150 (330)	0.68 (1.50)
	Propane	16 (35)	0.07 (0.16)
	70% Hydrogen peroxide	150 (330)	0.68 (1.50)
	JP-5	16 (35)	0.07 (0.16)
	70% Hydrogen peroxide	150 (330)	0.68 (1.50)
	RP-1	16 (35)	0.07 (0.16)
Armadillo Aerospace Large Prototype (AALP)	Ethanol	304 (670)	1.38 (3.05)
	LOX	435 (960)	1.98 (4.36)
Armadillo Aerospace Lunar Lander Analog Quad (LLAQ)	Ethanol	415 (915)	1.89 (4.16)
	LOX	585 (1,290)	2.66 (5.86)
Masten	Isopropanol	265 (585)	1.21 (2.66)
	LOX	442 (975)	2.01 (4.43)
MicroSpace	50% Hydrogen peroxide	91 (200)	0.41 (0.91)
	Methanol	15 (33)	0.07 (0.15)

[1] Acuity Technologies' current application indicates the preferred propellants are hydrogen peroxide and propane, but it may use JP-5 or RP-1 as a substitute fuel.

[2] The consumption rate assumes complete propellant consumption during a 220 second flight (the time for a complete Vertical Rocket Challenge).

The preparation of the reusable suborbital rocket would include vehicle assembly and engine test firing. Up to seven 30-second rocket engine test firings or suborbital launches would occur during the week prior to the Vertical Rocket Challenge and the Lunar Lander Challenge events to verify the flight safety systems for each participating reusable suborbital rocket. In addition, each reusable suborbital rocket would compete in a single Vertical Rocket Challenge or Lunar Lander Challenge pre-qualifying event. The Vertical Rocket Challenge event would consist of 220 seconds of rocket engine operation, and the Lunar Lander Challenge event would consist of 400 seconds of rocket engine operation. During the Vertical Rocket Challenge and the Lunar Lander Challenge events, each suborbital rocket would have a pre-assigned 150-minute period to transport the suborbital rocket from the staging area to the launch pad, complete the Vertical Rocket Challenge or Lunar Lander Challenge event, and return to the staging area. In the event of a tie, each suborbital rocket would have a pre-assigned 150-minute period to transport the suborbital rocket from the staging area to the launch pad, complete as many round trips as possible between the launch and landing pads, and return to the staging area. For each suborbital rocket participating in a tie-breaker, FAA assumed that the rocket engine would operate for a maximum of 30 minutes and the remaining 120 minutes would be required for transportation, preflight operations, and propellant loading activities.

The pre-flight ground operations would include propellant loading and preparations for launch. During preparations for launch, the suborbital rocket would be inspected for loosened electrical or mechanical connections prior to launch, and flight control diagnostics and health checks would be completed to ensure proper operation of electrical systems and moving parts. The suborbital rocket would initiate its formal launch sequence (i.e., ignition of its propulsion system) after all preparation and pre-flight operations are completed. Each suborbital rocket would carry a 25-kilogram (55-pound) payload that contains cameras and sensors used to monitor and broadcast flight attempts during the Vertical Rocket Challenge and the Lunar Lander Challenge events. With the exception of cameras and sensors used to monitor and broadcast flight video and data, the X Prize Foundation would provide the payload to each applicant.

After ignition of the rocket engines, the reusable suborbital rocket would take-off vertically from a launch pad, climb to an altitude greater than 50 meters (164 feet), maintain flight for 90 or 180 seconds, travel between 100 and 120 meters (328 and 394 feet), and land on a simulated lunar landing surface. Upon landing, the vehicle would touch down vertically and shut down its engines. Once the suborbital rocket had landed and shut down its engines, optional propellant reloading could occur. During this time, the team would have the option to perform propellant reloading operations only, no other repairs, additions, or changes to the vehicle would take place while on the ground. After completion of the optional propellant reloading, the reusable suborbital rocket would follow the same flight plan back to its point of origin. (Vertical Rocket Challenge and the Lunar Lander Challenge Draft Rules, 2006)

Propellants (fuel and oxidizer) for the suborbital rockets would require various transportable propellant storage containers, associated plumbing and pumps, and portable secondary containment structures. Other containers may be needed such as 208-liter (55-gallon) fuel drums, bottles of pressurized inert gases such as helium or nitrogen, or liquid nitrogen bottles. Following the propellant transfer, the propellant loading equipment would be removed from the area. Standard safety precautions would be followed such as clearing the area of unnecessary personnel and ignition (including spark) sources. In the event of a spill or release, propellant-loading operations would be halted until the spill is properly cleaned up by the applicant and has no reasonable chance of creating an explosion or fire hazard.

Liquid oxygen (LOX) would be stored in dewars; all other propellants would be stored in tankers. The LOX would be secured and stored in the hangar assigned to each entry participating in the X Prize Cup during off hours and on trucks located at the propellant staging area during the X Prize Cup event. Storage of propellants would be performed in accordance with all appropriate and relevant procedures and a specific propellant handling and storage plan for the airport developed in coordination with the FAA, Airport management, and city agencies.

Vehicle safing would begin upon completion of all launch and landing activities and the shut down of the engine and any flight control systems that are unnecessary for rocket recovery. The oxidizer system would be purged either by flash boiling, venting, or dumping. Next, the alcohol or hydrocarbon fuel lines would be drained into a suitable container approved by the Department of Transportation (DOT). Finally, the remaining pressurants (i.e., helium or nitrogen) would be

vented to the atmosphere prior to moving the suborbital rocket to its transport vehicle and returning to the staging area.

As described above, the proposed action includes issuing up to five experimental permits for the operation of 10 vehicles. The FAA used the propellant combinations allowed by the X Prize Foundation and those proposed by the applicants (see Exhibit 2-2) to define the range of propellants that could be used during the Vertical Rocket Challenge and the Lunar Lander Challenge. To calculate the amount of time that the rocket engine would be operating, FAA assumed the following:

- 10 suborbital rockets would perform a 30-second static engine test or test launch each day (seven days total) leading up to the Vertical Rocket Challenge and the Lunar Lander Challenge.
- Five suborbital rockets would compete in the Vertical Rocket Challenge pre-qualifying event (220 seconds of operation each).
- Five suborbital rockets would compete in the Lunar Lander Challenge pre-qualifying event (400 seconds of operation each).
- Five suborbital rockets would compete in the Vertical Rocket Challenge event (440 seconds of operation each).
- Five suborbital rockets would compete in the Lunar Lander Challenge event (800 seconds of operation each).
- 10 suborbital rockets would participate in a tie-breaker event (30 minutes of operation each).

Because the Vertical Rocket Challenge and Lunar Lander Challenge events would be round trip events and each vehicle could complete two attempts, the total time for each challenge is 440 seconds and 800 seconds, respectively. Exhibit 2-3 presents the total flight time for all the potential applicants and their vehicles including pre-competition testing.

The values presented in Exhibit 2-3 constitute conservative assessments of the total amount of rocket engine operation time based on the following assumptions:

- Each suborbital rocket would perform static tests or flights each day prior to the Vertical Rocket Challenge and the Lunar Lander Challenge,
- All the suborbital rockets would complete two attempts at the Vertical Rocket Challenge and the Lunar Lander Challenge, and
- All the suborbital rockets would be involved in a tie-breaker.

Exhibit 2-3. Total Engine Operation Time in Seconds for All Rockets

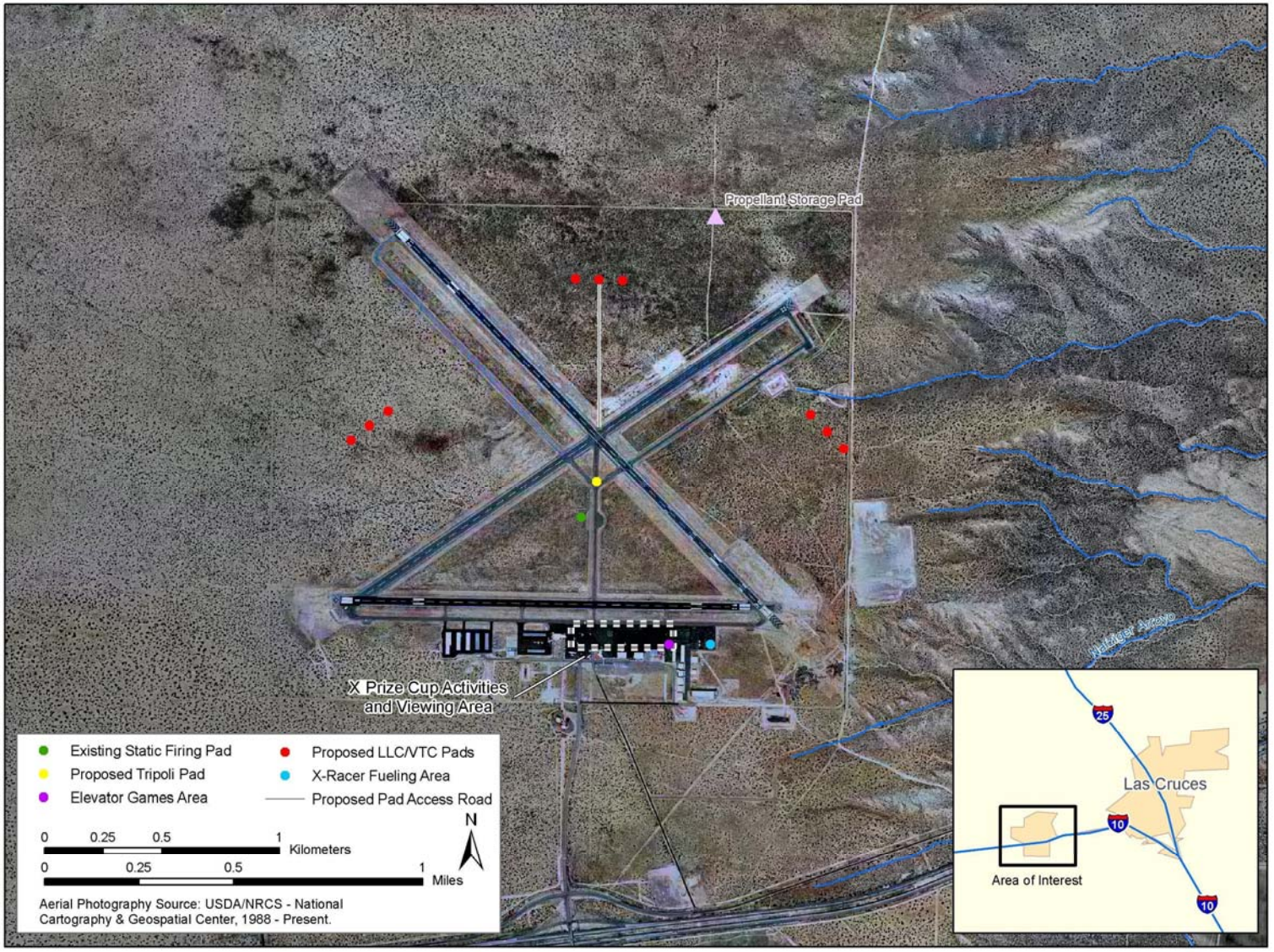
Number of Vehicles (maximum)	Fuel and Oxidizer	Preflight Activity, seconds (per vehicle)	Competition Activity, seconds (per vehicle)	Total Rocket Engine Operation, seconds
Two[1]	Propane Hydrogen peroxide	520	2,420	5,880
Two[1]	JP-5 Hydrogen peroxide	520	2,420	5,880
Two[1]	RP-1 Hydrogen peroxide	520	2,420	5,880
Four	Ethanol LOX	520	2,420	11,760
Two	Isopropanol LOX	520	2,420	5,880
Two	Methanol 50% hydrogen peroxide	520	2,420	5,880

[1] Acuity Technologies' current application indicates the preferred propellants are hydrogen peroxide and propane, but it may use JP-5 or RP-1 as a substitute fuel.

2.1.2 Infrastructure

New and existing infrastructure would be used for staging, static test firing, and for launches and landings of suborbital rockets. Launches and landings for the Vertical Rocket Challenge and the Lunar Lander Challenge would take place north, east, and west of the intersection of the runways more than 1,097 meters (3,600 feet) away from the crowd line, and more than 76 meters (250 feet) away from each of the runways (see Exhibit 2-4, Site Layout). Nine new launch and landing pads, a new propellant staging pad, and three new access roads would be required to support launches of reusable suborbital rockets competing in the Vertical Rocket Challenge and the Lunar Lander Challenge. Three separate operating areas made up of three pads each would be constructed. Two of the pads in each operating area would be flat and featureless for the Vertical Rocket Challenge, and one pad in each area would be a simulation of the lunar surface. This surface would be simulated by pouring some of the concrete at surface slopes up to seven degrees and placing rocks that are no more than a few inches in height around the pad for the Lunar Lander Challenge. Propellant trucks or trailers would be located at the propellant staging pad during the Vertical Rocket Challenge and the Lunar Lander Challenge and would either proceed to the launch and landing pads to reload the reusable suborbital launch vehicles or transfer propellant to a suitable container for transport to the launch and landing pads. The launch and landing pads each would measure 10 meters (33 feet) in diameter and be circular or octagonal in shape, and the propellant staging pad would measure 10 meters (33 feet) by 10 meters (33 feet). The new pads would be coated with heat-resistant gunnite, a mixture of cement, sand, and water. The surface of the pads would be at or below the level of the runways. The existing concrete pad located south of the cross-runways would be used for static test firing.

Exhibit 2-4. Layout Map



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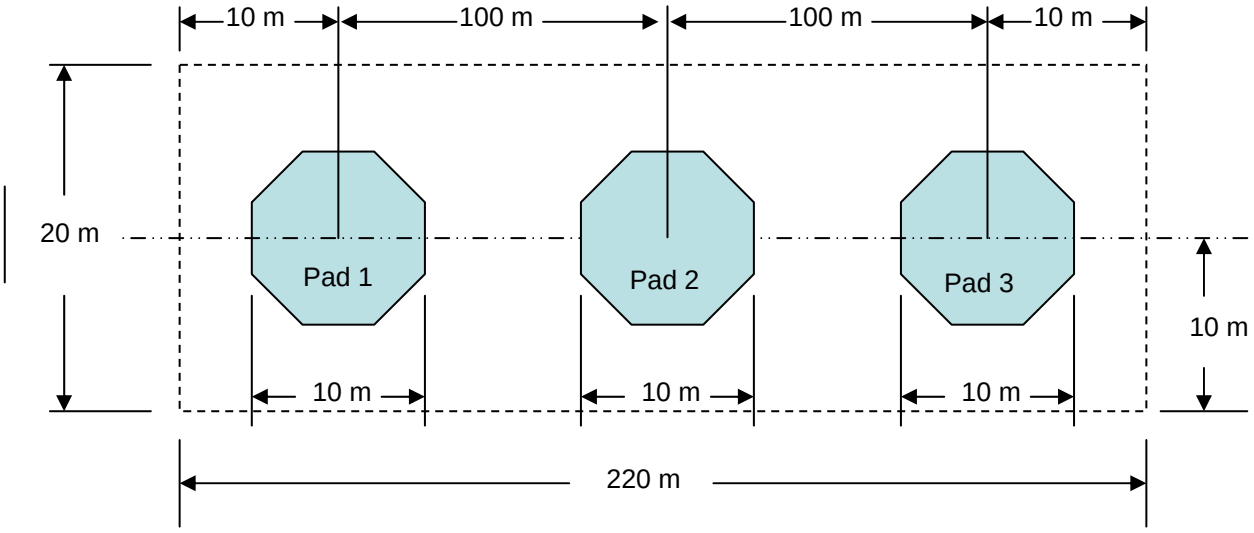
A temporary operation shelter (i.e., a steel shipping container) and a 5-kilowatt generator would be located with each set of launch and landing pads for a total of three shelters and generators. The generators would operate for up to a total of 10 hours during the Vertical Rocket Challenge and the Lunar Lander Challenge.

The access roads to each set of launch and landing pads would be graded gravel roads approximately 6 meters (20 feet) wide. The access roads would lead from an existing road to each set of three launch and landing pads and would be constructed at the same time as the pads. A total of 646 meters (2,119 feet) for an area of 3,941 square meters (42,380 square feet [<1 acre]) of new access roads would be constructed. In addition, the existing X-Racer propellant loading pad will be expanded from 37 square meters (400 square feet) to 149 square meters (1,600 square feet).

Site preparation activities for each pad and access road would consist of clearing and grading. The launch and landing pads would require pouring concrete. The construction of the new pads and access roads would require approximately two weeks to complete and would involve an excavator, grader, dump trucks, and concrete trucks. All construction activities would follow relevant and applicable best management practices and sediment and erosion control guidelines.

To reduce the fire hazard from engine exhaust, a 5-meter (16-foot) area would be cleared around each proposed launch and landing pad and a 20-meter (66-foot) wide corridor would be cleared between each set of three launch and landing pads. The pads would be spaced 100 meters (328 feet) apart for a total area of 4,440 square meters (47,652 square feet) [20 meters (66 feet) by 220 meters (722 feet)] (see Exhibit 2-5). The brush and other vegetation would be cleared from this area, and the area would be covered with light paving (runway millings) to reduce the fire hazard and the amount of dust generated by high velocity rocket engine exhaust. No new utility lines (i.e., water, electricity, communication) would be required to support the permitted reusable suborbital launch activities.

Exhibit 2-5. Proposed Pad and Operating Area Layout



In addition to the proposed launches and infrastructure, the applicants and the X Prize Foundation would obtain airspace use authorizations coordinated through the Certificate of Authorization or Waiver process and the Office of Commercial Space Transportation permit process for the X Prize Cup events. Through these processes, the FAA Albuquerque Air Route Traffic Control Center (ARTCC) and the Las Cruces International Airport would determine the airspace requirements and restrictions and disseminate that information through notices to airmen (NOTAMS).

2.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits to the applicants seeking to participate in the Vertical Rocket Challenge and the Lunar Lander Challenge and would not approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets from the Las Cruces International Airport and no construction activities. The nine launch and landing pads, propellant staging pad, and access roads associated with the Vertical Rocket Challenge and the Lunar Lander Challenge would not be constructed, and the expansion of the X-Racer propellant-loading pad would not occur. Because the FAA would not issue experimental permits, the Vertical Rocket Challenge and the Lunar Lander Challenge event would not take place; however, all the remaining X Prize Cup events would occur, as discussed in Section 1.1, Background. This would include the flights of the X-Racer; however, propellant loading would have to be performed from the existing pad. For the purposes of this analysis, these additional activities are considered and analyzed because they would contribute to cumulative impacts as discussed in Section 4.13.

2.3 Alternatives Considered But Not Carried Forward

For this EA, the FAA did not consider any other alternatives to issuing the experimental permits and approving the Airport Layout Plan (the proposed action) or not issuing the experimental permits and approving the Airport Layout Plan (the no action alternative). The proposed experimental permits would be associated with the specific X Prize Cup Vertical Rocket Challenge and the Lunar Lander Challenge event to be held at the Las Cruces International Airport on October 20 through 21, 2006, and would therefore be of limited duration and applicability.

3 AFFECTED ENVIRONMENT

This section describes the environmental characteristics that may be affected by the proposed action and alternatives. The affected environment is described succinctly to provide a context for understanding potential impacts. The level of detail provided for each resource area is commensurate with the potential for impact on that resource area.

The affected environment is discussed in terms of 12 resource areas: air quality (including construction impacts), biological resources – fish, wildlife, and plants (including construction impacts), cultural resources (including historical, architectural, and archaeological resources), geology and soils, hazardous materials and hazardous waste (including solid waste, pollution prevention, and natural resources and energy supply), health and safety, land use (including Section 4(f), and farmlands), noise and compatible land use, socioeconomic impacts, environmental justice, and children's environmental health and safety risks (including secondary (induced) impacts), transportation, visual resources (including light emissions and visual impacts), and water resources (including water quality, coastal resources, wild and scenic rivers, wetlands, and floodplains).

3.1 Region of Influence

The X Prize Cup will be held at the Las Cruces International Airport, which encompasses approximately 890 hectares (2,200 acres) of land atop a mesa, located 14 kilometers (9 miles) west of Las Cruces, New Mexico. (Las Cruces International Airport, 1997) The region of influence (ROI) is the general area that may be affected by the implementation of the proposed action or an alternative. For all resources except for air quality, noise, transportation, and socioeconomics, the ROI would be within the confines of the Las Cruces International Airport. For air quality, the ROI includes Doña Ana County, New Mexico. For noise, the ROI includes the area immediately surrounding the airport. The ROI for transportation includes the surrounding road network, and the ROI for socioeconomics includes the local area of Doña Ana County surrounding the airport.

3.2 Air Quality

3.2.1 Definition of Resource

Air quality in a given location is usually measured in terms of the concentration of various air pollutants in the atmosphere. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The primary air pollutants of concern fall into three categories.

- **Criteria Air Pollutants** are a group of seven pollutants identified in the Clean Air Act for which the U.S. Environmental Protection Agency (EPA) is required to establish allowable concentrations in ambient air: sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (including the compounds that contribute to its formation - volatile organic compounds [VOCs] and nitrogen oxides [NO_X]), particulate matter with a diameter less than 10 microns (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and lead (Pb).

The EPA has established National Ambient Air Quality Standards (NAAQS) for these criteria air pollutants (see Exhibit 3-1). To further define local and regional air quality, EPA divided the country into areas that achieve the NAAQS, attainment areas, and those that do not achieve the NAAQS, nonattainment areas. Some areas are unclassified because insufficient data are available to characterize them, while other areas are classified as maintenance areas, i.e., areas that are currently in compliance with the NAAQS but have held nonattainment status in the past.

- **Hazardous Air Pollutants** (HAPs) are a group of 188 chemicals identified in the Clean Air Act. (40 U.S.C. 7412(b)) Exposure to these pollutants has been shown to cause or contribute to cancer, birth defects, genetic damage, and other adverse health effects. Examples of HAPs include benzene, asbestos, and carbon tetrachloride.

- **Mobile source air toxics** are a group of 20 HAPs plus "diesel particulate matter and diesel exhaust organic gases," which are complex mixtures that contain numerous HAPs.

New Mexico developed State ambient air quality standards for particulates ($PM_{2.5}$ and PM_{10}), sulfur compounds (SO_2, hydrogen sulfide, and total reduced sulfur), CO, and NO_2 (see Exhibit 3-1).

Exhibit 3-1. Federal and New Mexico Air Quality Standards

Pollutant	Time Average	National Standard	New Mexico Standard
Ozone	8-hour average	0.08 parts per million (ppm)	None
	1-hour average	0.12 ppm	None
Carbon Monoxide	8-hour average	9.0 ppm	8.7 ppm
	1-hour average	35.0 ppm	13.1 ppm
Nitrogen Dioxide	Annual average	0.053 ppm	0.05 ppm
	24-hour average	None	0.10 ppm
Sulfur Dioxide	Annual average	0.03 ppm	0.02 ppm (1)
	24-hour average	0.14 ppm	0.10 ppm (1)
	3-hour average	0.5 ppm	None
Hydrogen Sulfide	1-hour average	None	0.010 ppm (3)
Total Reduced Sulfur	½-hour average	None	0.003 ppm (3)
Lead	Calendar quarter	1.5 micrograms per cubic meter ($\mu g/m^3$)	None
PM_{10}	Annual average	50 $\mu g/m^3$	60 $\mu g/m^3$ (2)
	24-hour average	150 $\mu g/m^3$	150 $\mu g/m^3$ (2)
$PM_{2.5}$	Annual average	15 $\mu g/m^3$	60 $\mu g/m^3$ (2)

Notes
(1) New Mexico standard with the exception of the area within 5.6 kilometers (3.5 miles) of the Chino Mines Company
(2) The maximum allowable concentrations of total suspended particulate in the ambient air
(3) New Mexico standard with the exception of the Pecos-Permian Basin Intrastate Air Quality Control Region

In addition, the State of New Mexico's Regional Haze State Implementation Plan complies with the requirements of Title 40 CFR 51.309, known as the Regional Haze Rule. The Regional Haze Rule addresses impairment across large geographic areas that affects visibility in mandatory Federal Class I areas, with a goal of returning visibility in Class I areas to natural conditions by the year 2064. Class I areas are designated as having special national or regional value from a natural, scenic, recreational, and/or historic perspective.

New Mexico established standards for Toxic Air Pollutants. Toxic Air Pollutants are chemicals that are generally found in trace amounts in the atmosphere, but that can result in chronic health effects or increase the risk of cancer when present in amounts that exceed established exposure limits. The Toxic Air Pollutants regulated by the New Mexico Environment Department (NMED) may be found in the New Mexico Administrative Code 20.2.72.502, available at the following Internet address, http://www.nmcpr.state.nm.us/nmac/parts/title20/20.002.0072.htm. The NMED applies guidelines for determining if a new or modified source emitting a Toxic Air Pollutant requires air quality permitting.(20.2.72.402 New Mexico Administrative Code)

New Mexico operates the ambient air-quality monitoring network with stations located throughout the state. The ambient air monitoring stations are located in areas that either have elevated levels of air pollutants or have the potential for elevated levels. The nearest air quality monitoring stations are located in the city of Las Cruces, approximately 14 kilometers (9 miles) east of the Las Cruces International Airport.

3.2.2 Existing Conditions

The Las Cruces area climate is characterized by its extended summer season and mild fall and winters. The normal daily temperatures range from -2 to 13 degrees Celsius (29 to 56 degrees Fahrenheit) in January to 20 to 36 degrees Celsius (68 to 97 degrees Fahrenheit) in July. On average the Las Cruces area experiences 193 days of clear skies, 100 days of partly cloudy skis, and 73 days of cloudy skies per year. (Las Cruces International Airport, 1997)

Currently, the Las Cruces International Airport area is in attainment for all Federal and State listed criteria pollutants. A portion of Doña Ana County, Anthony, New Mexico, located approximately 80 kilometers (50 miles) southeast of the airport is designated a moderate nonattainment area for PM_{10}. (USEPA, 2006b) The New Mexico Environment Department's NMEDAir Quality Bureau has implemented a Natural Events Action Plan (NEAP) for Doña Ana County to address violations of the PM_{10} standard caused by natural high wind events. The NEAP is designed to mitigate health impacts from man-made sources of windblown dust where natural soils have been disturbed by human activities. The NEAP includes erosion control ordinances for the City of Las Cruces (Ordinance No. 1789) and Doña Ana County (Ordinance No. 194-2000). These ordinances require that all ground-disturbing activities use erosion control measures to mitigate visible fugitive dust.

3.3 Biological Resources – Fish, Wildlife, and Plants

3.3.1 Definition of Resource

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Biological resources are described in terms of vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitats. Applicable Federal, State, and local statutes designed to protect indigenous and special status species present within the affected area are also cited in this section.

The U.S. Fish and Wildlife Service (USFWS) administers the Endangered Species Act, which states that all Federal departments and agencies shall seek to conserve endangered species and threatened species. Endangered species means any plant or animal species in danger of extinction throughout all or a significant portion of its range. The Act defines a threatened species as any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Special status species are defined as plant or animal species that are candidates for, proposed as, or listed as sensitive, threatened, or endangered by USFWS. In addition to federally listed species, the State of New Mexico has two laws designed to protect animals and plants, the Wildlife Conservation Act (New Mexico Statutes Annotated 1978 § 17-2-37 *et seq*.) and the Endangered Plant Species Act (New Mexico Statutes Annotated 1978 § 75-6-1). The New Mexico Department of Game and Fish (NMDGF), Conservation Services Divisions, administers the Wildlife Conservation Act. Through the Act, the NMDGF administers the listing of special status animal species in coordination with other Federal, State, and local organizations. The Forestry Division of the Energy, Minerals, and Natural Resources Department administers the Endangered Plant Species Act. This Act only acknowledges an "Endangered" status for plants in New Mexico, and no list is currently available through the Department. In its place, the New Mexico Rare Plant Technical Council maintains a list of special status plants developed through collective agency efforts, academic research, and field surveys. (New Mexico Rare Plant Technical Council, 2005)

3.3.2 Existing Conditions

Vegetation

The Las Cruces International Airport is located in the ecoregion known as the Central Rio Grande Intermontane. (Geocities, 2006) The majority of the area is classified as Chihuahuan Broadleaf Deciduous Desert Scrub, which are shrublands dominated by broadleaf deciduous shrubs that are cold intolerant and drought tolerant. The dominant species in this area include tarbush (*Flourensia cernua*), honey mesquite (*Prosopis glandulosa*), whitethorn (*Acacia constricta, A. neovernicosa*) and ocotillo (*Fouquieria splendens*). The sub-dominant shrubs include fourwing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia sarothrae, G. microcephala*), sotol (*Dasylirion wheeleri*), little-leaf sumac (*Rhus microphylla*), cholla (*Opuntia imbicata*), and Christmas cactus (*Opuntia leptocaulis*). Herbaceous cover varies from very sparse to grass dominated, including fluffgrass (*Erioneuron pulchellum*), mesa dropseed

(*Sporobolus flexuosus*), alkali sacaton (*S. airoides*), lemonweed (*Pectis papposa*) and mallow (*Sphaeralcea* spp.). (New Mexico Cooperative Fish and Wildlife Research Unit, 1996)

A smaller portion of the Las Cruces International Airport is classified as Chihuahuan Foothill-Piedmont Desert Grassland, which is grassland of mountain foothills, mesa tops and piedmont slopes (bajadas). The dominant species include black grama (*Bouteloua eriopoda*) and mesa dropseed (*Sporobolus flexuosus*). Shrubs species include soaptree yucca (*Yucca elata*), banana yucca (*Yucca baccata*), mormon tea (*Ephedra trifurca, E. torreyana & E. nevadensis*), stool (*Dasylirion wheeleri*), cholla (*Opuntia imbicata*), and mariola (*Parthenium incanum*). The diverse herbaceous layer typically includes spiderling (*Boerhavia* spp.), blanket flower (*Gaillardia pulchella*), goldenweed (*Haplopappus gracilis*), globemallow (*Sphaeralcea subhastata*), mouse ear (*Tidestromia lanuginosa*), and zinnia (*Zinnia acerosa*). (New Mexico Cooperative Fish and Wildlife Research Unit, 1996)

The proposed launch and landing pads and associated access roads would be located within 800 meters (2,625 feet) of the active runways in the vegetative communities described above. These areas have been disturbed by former construction activities and the active use of the airport since 1942. (Metropolitan Planning Organization, Las Cruces, Mesilla, Doña Ana County, 2005)

Wildlife

Because the vegetative communities surrounding the airport have been previous disturbed during construction of the airport and are actively disturbed by airport operations, only species tolerant of such vegetative disturbances would persist in the area including small mammals (e.g., rabbits) and lizards. In addition, transient species, large mammals (e.g., deer) and birds may pass through the area for brief periods of time.

Migratory Birds

Many of the species of birds typically present at the Las Cruces International Airport are included in international conventions under the Migratory Bird Treaty Act (MBTA). The MBTA prohibits private parties and, in some circumstances, federal agencies, from take of covered birds, nests, and eggs. Take is defined to mean "pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR §10.21). The MBTA prohibits taking, selling, or other activities that would harm migratory birds, their eggs or nests, unless the Secretary of the Interior authorizes such activities under a special permit.

Threatened and Endangered Species

Exhibit 3-2 below presents all the species that are considered threatened or endangered in Doña Ana County as designated by either the NMDFG or the USFWS.

Exhibit 3-2. Threatened and Endangered Species in Doña Ana County, New Mexico

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat
American peregrine falcon	*Falco peregrinus anatum*	delisted	threatened	A dominant landscape feature, usually a cliff; occasionally trees or tall manmade structures
Aplomado falcon	*Falco femoralis septentrionalis*	endangered	endangered	Open habitats ranging from coastal prairie and other grasslands to open woodlands; usually nests in trees or shrubs
Baird's sparrow	*Ammodramus bairdii*	species of concern	threatened	Shortgrass and desert grasslands or praries
Bald eagle	*Haliaeetus leucocephalus*	threatened	threatened	Coastal areas, river, lakes, and reservoirs with forested shorelines or cliff
Bell's vireo	*Vireo bellii*	n/a	threatened	Dense shrubland or woodland along lowland stream courses; also Mojave desert scrub habitat
Broad-billed hummingbird	*Cynanthus latirostris magicus*	n/a	threatened	Open stands of creosote bush and large succulents characteristic of Chihuahuan Desert Scrub habitat
Common black-hawk	*Buteogallus anthracinus anthracinus*	n/a	threatened	Desert riparian deciduous woodland (cottonwoods) where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins
Common ground dove	*Columbina passerina pallescens*	n/a	endangered	Open stands of creosote bush and large succulents characteristic of Chihuahuan Desert Scrub habitat; also native shrublands in riparian areas
Costa's hummingbird	*Calypte costae*	n/a	threatened	Open to dense vegetation of shrubs, low trees, and succulents; also Mojave desert scrub habitat
Gray viero	*Vireo vicinior*	n/a	threatened	Arid juniper woodlands on foothills and mesas, associated with oaks and grassland
Least tern (interior pop.)	*Sterna antillarum*	endangered	endangered	Sandbars in rivers, beaches in coastal areas that are sandy and relatively free of vegetation

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat
Mexican spotted owl	*Strix occidentalis lucida*	threatened	sensitive	Large trees, snags, down logs, dense canopy cover, and multi-storied conditions within predominantly mixed-conifer and pine-oak habitats
Mountain plover	*Charadrius montanus*	species of concern	sensitive	High plains, shortgrass prairie, and dirt (plowed) fields, often in association with prairie dogs
Neotropic cormorant	*Phalacrocorax brasilianus*	n/a	threatened	Near or over water, usually larger bodies such as reservoirs; in vegetation such as dead snags or trees
Varied bunting	*Passerina versicolor*	n/a	threatened	Sonoran Desert Scrub; Chihuahuan Desert Scrub; Desert Riparian Deciduous Woodland, Marsh habitat
Violet-crowned hummingbird	*Amazilia violiceps ellioti*	n/a	threatened	Sonoran Desert Scrub and well-developed riparian habitat
Whooping crane	*Grus americana*	endangered	endangered	Desert Riparian Deciduous Woodland, Marsh habitat
Willow Flycatcher	*Empidonax traillii extimus*	endangered	endangered	Shrubs and small trees in willow thickets, shrubby mountain meadows, and decidous riparian woodlands
Yellow-billed cuckoo	*Coccyzus americanus*	candidate	n/a	Open to dense stands of shrubs and low trees; Sonoran Desert Scrub; Chihuahuan Desert Scrub; Desert Riparian Deciduous Woodland, Marsh habitat
Colorado Chipmunk	*Neotamias quadrivittatus australis*	species of concern	threatened	Organ Mountains at elevations 1,845-2,225 meters (6,053-7,300 feet); most common in Ponderosa pine forest; also mixed coniferous forest and woodland
Desert bighorn sheep	*Ovis canadensis mexicana*	n/a	endangered	Arid, rocky mountains, mainly in open habitats; pinyon-juniper to desert scrub habitats
Spotted Bat	*Euderma maculatum*	n/a	threatened	Desert areas at lower elevations where suitable cliff habitats are present; also meadows, woodlands, and open semi-desert shrublands

Common Name	Scientific Name	Federal Status	State Status	Preferred Habitat
Doña Ana Talussnail	*Sonorella todseni*	species of concern	threatened	Occurs only in the Doña Ana Mountains at elevations of 1,600 meters (5,249 feet); associations with igneous rock talus, live oaks and desert shrubs
Rio Grande silvery minnow	*Hybognathus amarus*	endangered	n/a	Variety of habitats in low-gradient, large streams with shifting sand or silty bottoms; Rio Grande and Pecos Rivers
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	endangered	n/a	Grasslands or shrublands on limestone outcrops and rocky slopes of mountains within the Chihuahuan Desert

Sources: Biota Information System of New Mexico, 2004; USFWS, 2006
n/a = not listed

3.4 Cultural Resources (including Historical, Architectural, and Archeological Resources)

3.4.1 Definition of Resource

Cultural resources include "historic properties" defined in Section 106 of the National Historic Preservation Act (NHPA) as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places (National Register). In addition, cultural resources include Native American Resources (i.e., sacred sites and traditional cultural properties) and National Natural Landmarks.

3.4.2 Existing Conditions

Previous surveys in 1998 at the Las Cruces International Airport identified four archaeological sites that are eligible for listing in the National Register under Criterion D[4] and one site that would require additional testing to determine its eligibility for listing in the National Register. (Peterson, 1998) No historic sites listed in the National Register are located at or in the immediate vicinity of the Las Cruces International Airport. (National Register, 2006) No National Natural Landmarks are present at the airport. (NPS, 2006a)

3.5 Geology and Soils

3.5.1 Definition of Resource

The geology of a particular area can be described as the physical nature and history of the Earth, the composition of the rocks from which it is composed, and the changes that it has undergone or

[4] Criterion D applies to properties that have yielded or may be likely to yield information important in prehistory or history. (Sherfy, 1990)

is undergoing. Soils are defined as earthen material that has been modified and acted upon by physical, chemical, and biological agents so as to be able to support rooted plants.

3.5.2 Existing Conditions

The Las Cruces International Airport sits atop a mesa; the topography of the airport and surrounding areas is essentially flat. (Las Cruces International Airport, 1997) Other major landforms are valleys and lowland and outwash plains, and alluvial fans and terraces. The Rio Grande basin is the major landform feature of the region. Soils at the airport include bluepoint loamy sand, bluepoint-Caliza-Yturbide complex, Cacique-Cruces association, Tencee-Upton association, and Wink-Pintura complex. Of the soils present at the airport, only the bluepoint loamy sand is classified as a hydric soil that is capable of supporting wetland vegetation.

The Las Cruces area has a low level of seismic activity. An earthquake with a magnitude of five or greater on the Richter scale has

- 0.03 probability of occurring in a 10-year period, and
- 0.14 probability of occurring in a 50-year period. (USGS, 2006)

3.6 Hazardous Materials and Hazardous Waste Management (including Solid Waste, Pollution Prevention, and Natural Resources and Energy Supply)

3.6.1 Definition of Resource

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA) Section 1004(5) as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed." While the definition refers to "solids," it has been interpreted to include semisolids, liquids, and contained gases. (Wentz, 1989) Hazardous waste is further defined in 40 CFR 261.3 as any solid waste that possesses hazardous characteristics of toxicity, ignitability, corrosivity, or reactivity, or is listed as a hazardous waste in Subpart D of 40 CFR Part 261.

Hazardous materials and hazardous wastes are also encompassed within the definition of hazardous substances as identified in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. Sections 9601-9675) and the Toxic Substances Control Act (TSCA). (15 U.S.C. Sections 2601-2671) The Hazardous Materials Transportation Act (49 U.S.C. Section 1801, Parts 172-173) regulates the transportation of hazardous materials. (Legal Information Institute, 2005)

3.6.2 Existing Conditions

The Las Cruces International Airport does not contain any National Priority List (NPL) sites under CERCLA. (USEPA, 2006c) A fuel storage facility containing a 75,708-liter (20,000-gallon) above ground storage tank for Avgas 100LL and a 37,854-liter (10,000-gallon) above ground storage tank for Jet A are located on the east side of the airport. A 37,854-liter (10,000-

gallon) underground storage tank that is not in use is located under the airport apron. (Las Cruces International Airport, 1997) In addition, traditional fixed based operator services (aircraft fueling, line service and maintenance) are performed at the airport. Hazardous materials used during aircraft maintenance (i.e., degreasers, lubricants, paints, hydraulic fluid and other materials) are stored, handled, and disposed of in accordance with federal and state regulations. (Las Cruces International Airport, 1997)

The Las Cruces Utilities Department provides solid waste collection and disposal services to the City of Las Cruces, including the Las Cruces International Airport. All airport operations including waste management would be conducted in accordance with existing site-specific procedures and all applicable Federal, state, and local regulations and requirements to minimize or prevent pollution where possible. As a municipal airport, the airport falls under the City of Las Cruces's pollution prevention and waste management plans. Current energy demands are met by the El Paso Electric Company New Mexico Division and Rio Grande Natural Gas Association.

3.7 Health and Safety

3.7.1 Definition of Resource

Health and safety includes consideration of any activities, occurrences, or operations that have the potential to affect the well-being, safety, or health of workers or members of the general public.

3.7.2 Existing Conditions

Operations at the Las Cruces International Airport follow all National Fire Protection Association, Occupational Safety and Health Administration, and applicable state and Federal guidelines for health and safety. The airport conducts regular safety inspections and has established standard operating procedures to meet occupational and system safety requirements. In accordance with the Federal Aviation Regulations Part 139 relating to Airport Rescue and Firefighting, an Airport Rescue and Firefighting Facility is not required at the airport because there are on average fewer than five flights daily by aircraft having at least 30 seats. (Las Cruces International Airport, 1997)

3.8 Land Use (including Department of Transportation 4(f) Resources and Farmlands)

3.8.1 Definition of Resource

The EPA defines land use as "the way land is developed and used in terms of the kinds of anthropogenic activities that occur (e.g., agriculture, residential areas, and industrial areas)." (USEPA, 2006a) Land use is a critical element in understanding the context in which the proposed action would occur.

The FAA also must consider impacts under Section 4(f) of the Department of Transportation Act. Section 4(f) of the Department of Transportation Act was re-codified and renumbered as Section 303(c) of 49 U.S.C., and provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park,

recreation area, wildlife or waterfowl refuge of national, state, or local significance, or land from an historic site of national, state, or local significance as determined by the officials having jurisdiction. These provisions apply unless there is no feasible and prudent alternative to the land use and the project includes all possible planning to minimize harm resulting from the use.

Prime, unique, and important farmlands are designated by the Natural Resources Conservation Service (NRCS) using the definitions set forth under the Farmland Protection Policy Act (FPPA).

3.8.2 Existing Conditions

The land use in the area is made up of industrial/commercial areas including the Las Cruces International Airport and the West Mesa Industrial Park south and adjacent to the airport. The land immediately surrounding the airport is undeveloped and is owned by the State of New Mexico. (Las Cruces International Airport, 1997) The U.S. Bureau of Land Management (BLM) owns the land outside the State of New Mexico Land (see Exhibit 2-3).

On the airport, none of the land contains a public park, recreation area, wildlife or waterfowl refuge of national, state, or local significance, or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction. In addition, none of the soils present at the airport are suitable soils for unique or prime farmland as defined under the FPPA. (NRCS, 2006)

3.9 Noise and Compatible Land Use

3.9.1 Definition of Resource

Noise is often defined as unwanted or annoying sound that is typically associated with human activity. Most sound does not consist of a single frequency, but rather a mixture of frequencies, with each frequency differing in sound level.

The amplitude of sound is described in a unit called decibels (dB). Decibels are measured on a logarithmic scale because the range of sound pressures encountered by human ears covers a very broad range. The dB scale simplifies this range of sound pressures to a scale of 0 to 140 dB and allows the measurement of sound to be more easily understood. Although not exactly analogous, the decibel scale is similar to the commonly used earthquake Richter scale. As such, a 120 dB sound is not twice the amplitude of a 60 dB sound, but a 1,000-fold increase. In most cases, adding two identical sound sources would increase the decibel level by three dB (100 dB plus 100 dB equals 103 dB).

Noise sources can be continuous (e.g., constant noise from traffic on a busy street or refrigeration units) or transient (e.g., passing noise from a jet overflight or an explosion). Noise sources can also have a broad range of frequency content (pitch), which can be rather nondescript, such as noise from traffic, or can be very specific and readily identifiable, such as a whistle or a car alarm.

There are many methods for quantifying noise, depending on the potential impacts in question and on the type of noise. One useful noise metric is the Day Night Level (DNL), which is the

average sound level over an entire day (Leq24H), with 10 dB added between 10 PM and 7 AM to account for the increased annoyance of noise during these hours.

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of noise impacts.

3.9.2 Existing Conditions

The existing conditions and operational levels and the 2015 forecasted conditions of the 75 dB to 60 dB day/night average noise contour levels are contained within Las Cruces International Airport property. No noise sensitive receptors (residences, churches, schools, hospitals, or nursing homes) occur around the Las Cruces International Airport. In addition, Doña Ana County adopted a zoning ordinance, which restricts residential development within a 4-kilometer (2.5-mile) radius of the airport. (Las Cruces International Airport, 1997)

3.10 Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

3.10.1 Definition of Resource

CEQ regulations implementing NEPA state that when economic or social effects and the natural or physical environmental effects are interrelated, the NEPA document will discuss these effects on the human environment. (40 CFR 1508.14) The CEQ regulations state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* tasks Federal agencies to make achieving environmental justice part of their mission by identifying and addressing disproportionately high and adverse public health or environmental effects of programs, policies, and activities on minority and low-income populations. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs Federal agencies, as appropriate and consistent with the agency's mission, to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children.

3.10.2 Existing Conditions

This section describes general socioeconomic characteristics of the region that is made up of Doña Ana County and the city of Las Cruces, which is the closest population center to the proposed operational area. According to Census 2000 data, Doña Ana County has a total population of 174,682 and population density of 5.8 people per square kilometer (45.9 people per square mile). The largest population center near the airport is Las Cruces, which has 74,267 residents. The unemployment rates in Doña Ana County and Las Cruces are 5.4 percent and 5.1 percent, respectively. The median household incomes for Doña Ana County and Las Cruces are $29,808 and $30, 3755, respectively. (U.S. Census Bureau, 2000) There are no populations or

residential areas that would fall under the protection of EO 12898 or EO 13045 within 4 kilometers (2.5 miles) of the Las Cruces International Airport. (Las Cruces International Airport, 1997)

Fire and emergency services for the Las Cruces International Airport are provided by the City of Las Cruces Fire Department (LCFD). The LCFD has 117 personnel who staff six Engine Companies and one Truck Company, as well as four civilian support staff. In addition to fire suppression and emergency medical services, the LCFD also offers special response teams including technical rescue services, hazardous materials response, and aircraft rescue and firefighting. (City of Las Cruces Fire Department, 2006) The Las Cruces area is serviced by three full service (emergency care, in-patient, and out-patient) hospitals/medical centers, Memorial Medical Center, Mountain View Regional Medical Center, and Mesilla Valley Hospital. (Joint Commission on Accreditations on Healthcare Organizations, 2006) Lodging in the Las Cruces area is provided by over 49 different hotels, motels, Bed & Breakfast Inns and Recreational Vehicle Parks. (Las Cruces New Mexico Convention and Visitors Bureau, 2006)

3.11 Transportation

3.11.1 Definition of Resource

Transportation as a resource can be described as the means, accessibility, and ease in which to move goods, personnel, and equipment to and from a given area. Regulations pertaining to transportation are implemented by the DOT and are located in Title 49 of the CFR. Title 49 includes regulations applicable to highways (49 CFR 300-399; 49 CFR 500-599), transportation safety (49 CFR 800-899), and surface transportation generally (49 CFR 1000-1199).

3.11.2 Existing Conditions

The existing transportation infrastructure within Las Cruces and the Metropolitan Planning Organization (MPO) consists of two Interstate Highways (I-10 and I-25), US Highway 70, numerous state highways, and local roadways. The Las Cruces International Airport is located off of exit 132 north of US Interstate Highway 10. Numerous paved service roads provide direct access to the airport, including Box Canyon Drive, Zia Boulevard, and Gasoline Alley (see Exhibits 2-3 and 2-4). Interstate 10 connects the Las Cruces area to Texas and Arizona. It carries 11,000 passenger cars and trucks/day west of Las Cruces and increases to 18,000 south of its interchange with I-25. It is the main east-west truck route through the region. Truck traffic totals some 4,947 per day. The average daily traffic on I-25 ranges from 14,000 north of I-10, to 18,000 at US Highway 70, and 5,000 further north of Las Cruces. (Metropolitan Planning Organization, Las Cruces, Mesilla, Doña Ana County, 2005)

3.12 Visual Resources (including Light Emissions and Visual Impacts)

3.12.1 Definition of Resource

Visual resources can be described as any naturally occurring or man-made feature that contributes to the aesthetic value of an area. Proposed changes to visual resources can be assessed in terms of 'visual dominance' and 'visual sensitivity.' Visual dominance describes noticeable physical changes within an area. The magnitude of visual dominance varies

depending on the degree of change in an area. Visual sensitivity can be attributed to a particular setting and the desire to maintain the current visual resources of the viewshed. Areas such as coastlines, national parks, and recreation or wilderness areas are usually considered to have high visual sensitivity. Heavily industrialized urban areas tend to be the areas of the lowest visual sensitivity.

3.12.2 Existing Conditions

The existing visual setting has low visual sensitivity and is dominated by the airport facilities and operations that take place at Las Cruces International Airport. Surrounding the airport is open land, gravel quarries, and a major highway.

3.13 Water Resources (including Water Quality, Coastal Resources, Wild and Scenic Rivers, Wetlands, and Floodplains)

3.13.1 Definition of Resource

Water resources include surface water features such as lakes, rivers (including wild and scenic rivers), wetlands, and floodplains, as well as ground water resources (aquifers). The primary Federal legislation that addresses water quality is the Clean Water Act (CWA), which regulates all discharges into "waters of the United States." Wetlands and intermittent streams are both considered waters of the United States. The goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Section 404 of the CWA requires consultation prior to the alteration of streams or waters of the U.S., and most alteration activities require permits. Compliance with Section 404 of the CWA within the State of New Mexico is administered by the U.S. Army Corps of Engineers in Albuquerque. The CWA also requires that all point sources discharging pollutants into waters of the U.S. must obtain a National Pollution Discharge Elimination System permit. Construction activities discharging runoff or fill material into wetlands, streams, or arroyos would also require a permit. A description of the various water features is followed by a description of the water quality associated with the feature.

3.13.2 Existing Conditions

No permanent surface water bodies are located at the Las Cruces International Airport. The general surface water flow from the airport is towards the east. Three intermittent arroyos are located along the eastern side of the airport (see Exhibit 2-3); however, given the semi-arid nature of the region, these streams are typically dry and only active for a few days following rainfall events during the rainiest months, July and August. On average, the Las Cruces area receives 22.4 centimeters (8.81 inches) of rain and 14 centimeters (5.5 inches) of snowfall each year. The arroyos flow towards the Rio Grande River, located approximately 10 kilometers (6.2 miles) east of the Las Cruces International Airport. A portion of the Rio Grande is designated as Wild and Scenic River, near the Colorado border, approximately 628 kilometers (390 miles) north and upstream of Las Cruces. There are no areas designated as 100 year or 500 year floodplains located at the Las Cruces International Airport. (Federal Emergency Management Agency Issued Flood Maps, 2006) There are no coastal resources located near Las Cruces International Airport.

Ground water resources within the region consist of the Mesilla Bolson Aquifer, which extends the entire length of the Mesilla Valley. The City of Las Cruces has a system of 30 wells in the region, which provide about 26.5 billion liters (7 billion gallons) of drinking water annually. These wells withdraw water from depths between 91 to 305 meters (300 to 1,000 feet). The results of water quality testing in 2004 by the NMED Drinking Water Bureau and the City of Las Cruces did not indicate any ground water contamination in excess of levels allowed by state and Federal regulations. (City of Las Cruces, 2005)

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4 ENVIRONMENTAL CONSEQUENCES

This section examines the potential environmental impacts that may result from implementing the proposed action or the no action alternative. This section presents the direct, indirect, and cumulative impacts on each of 12 resource areas presented in Chapter 3, Affected Environment: air quality, biological resources, cultural resources, geology and soils, hazardous materials and hazardous waste, health and safety, land use, noise, socioeconomics and environmental justice, transportation, visual resources, and water resources. The impact assessment includes the review of construction impacts associated with each resource area.

4.1 Air Quality

This section addresses the potential impact on air quality from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup. Impacts on air quality are assessed by estimating the potential to cause deterioration in the air quality surrounding the launch site (Las Cruces International Airport) in accordance with the Clean Air Act (CAA). This section provides emission estimates associated with the proposed action and the no action alternative and evaluates the potential air quality impacts of these emissions.

4.1.1 Proposed Action

Construction of three operating areas with nine new launch and landing pads, the propellant staging pad, associated access roads, and expanding the X-Racer propellant loading pad would require clearing of approximately 1.72 hectares (4.25 acres). The earth-moving and soil disturbance activities would result in short-term (two weeks) emissions of PM_{10}, $PM_{2.5}$, and fugitive dust emissions. Because of the relatively small area that would be disturbed, the limited duration of the disturbance, and the use of best management practices during construction, less than 5 tons (10,000 pounds) combined of PM_{10}, $PM_{2.5}$, and fugitive dust would be emitted. The operation of the construction equipment would emit CO, PM_{10}, NO_X, VOCs, and SO_X, with PM_{10} and NO_X comprising the majority of the emissions. Because of the short construction period (two weeks) and limited number of construction vehicles involved (i.e., excavator, grader, dump trucks, and concrete trucks), the emissions from the operation of such vehicles would be negligible. In addition, disturbed areas would be covered with cement for the launch/landing and propellant pads, runway millings for fire hazard areas, and gravel for access roads. These activities, in addition to the use of best management practices during construction, would reduce potential erosion and fugitive dust emissions and would meet the Best Available Control Measures and erosion control ordinances outlined in Doña Ana County's NEAP.

To estimate emissions from the launch of the reusable suborbital rockets that would participate in the Vertical Launch Challenge and the Lunar Lander Challenge, the FAA used the information from Section 2.1.1 on the propellants, the amount of rocket engine operation time, and the number of reusable suborbital rockets that would participate. The FAA calculated the total propellant consumed for each reusable suborbital rocket type. Propellant-specific emission weight fractions were applied to these propellant consumption estimates to calculate emissions from each type of reusable suborbital rocket. The emission weight fractions used in this analysis are summarized in Exhibit 4-1. To calculate the total emissions by reusable suborbital rocket, the emission weight-

fraction by emission type is multiplied by the total time of rocket engine operation and the propellant consumption rate. All the CO emissions in the turbulent and hot emission cloud are assumed to oxidize into carbon dioxide (CO_2). The estimated total emissions per reusable suborbital rocket are presented in Exhibit 4-2.

Exhibit 4-1. Emission Weight Fractions[a]

Propellant Combination (Fuel/Oxidizer)	Emissions/Unit Propellant Consumed, kilograms (pounds)		
	H_2O	CO_2	CO
Propane/70% hydrogen peroxide	0.76 (1.67)	0.15 (0.33)	0.09 (0.198)
JP-5/70% hydrogen peroxide	0.73 (1.61)	0.22 (0.48)	0.05 (0.11)
RP-1/70% hydrogen peroxide	0.73 (1.61)	0.22 (0.48)	0.05 (0.11)
Ethanol/LOX	0.48 (1.06)	0.03 (0.07)	0.48 (1.06)
Isopropanol/LOX	0.35 (0.77)	0.65 (1.43)	--
Methanol/50% hydrogen peroxide	0.81 (1.78)	0.18 (0.396))	0.01 (0.022)

[a] These weight fractions were estimated using a mass balance approach assuming: (1) oxygen first oxidizes hydrogen completely to form H_2O (water) and then forms CO_2 and CO with the remaining oxygen, and (2) water in dilute hydrogen peroxide passes through combustion as an inert ingredient. Due to the heat and turbulence of the emissions, all CO that would be emitted would oxidize into CO_2. (FAA, 2006)

Exhibit 4-2. Total Emissions per Reusable Suborbital Rocket

Applicant Rocket Propellants, kilograms (pounds)	Consumption Rate, kilograms/second* (pounds/second)	Total Operation Time (seconds)	Emissions, kilograms (pounds)**	
			H_2O	CO_2
Acuity Aerospace – preferred propellants Propane 16 (35) 70% hydrogen peroxide 150 (330)	0.75 (1.66)	5,880	3,352 (7,374)	1,058 (2,328)
Acuity Aerospace – alternate propellants JP-5 16 (35) 70% hydrogen peroxide 150 (330)	0.75 (1.66)	5,880	3,219 (7,082)	1,191 (2,620)
Acuity Aerospace – alternate propellants RP-1 16 (35) 70% hydrogen peroxide 150 (330)	0.75 (1.66)	5,880	3,219 (7,082)	1,191 (2,620)
Armadillo Aerospace AALP Ethanol 304 (670) LOX 435 (960)	3.36 (7.41)	5,880	9,483 (20,863)	10,076 (22,167)
Armadillo Aerospace LLAQ Ethanol 415 (915) LOX 585 (1,290)	4.55 (10.02)	5,880	12,842 (28,252)	13,645 (30,019)

Applicant Rocket Propellants, kilograms (pounds)	Consumption Rate, kilograms/second* (pounds/second)	Total Operation Time (seconds)	Emissions, kilograms (pounds)**	
			H_2O	CO_2
Masten Space Systems Isoproanol 265 (585) LOX 442 (975)	3.21 (6.49)	5,880	6,606 (14,533)	12,269 (26,992)
MicroSpace Methanol 15 (33) 50% hydrogen peroxide 91 (200)	0.48 (1.06)	5,880	2,286 (5,029)	536 (1,179)
TOTAL EMISSIONS* **			**34,569 (76,052)**	**37,584 (82,685)**

*Consumption rate equals the propellants consumed for each vehicle based on an operating time of 220 seconds per flight.
**Emissions are calculated by multiplying the consumption rate by the total operating time by the weight fraction for a specific constituent.
***The total emissions do not include JP-5 and 70% hydrogen peroxide or RP-1 and 70% hydrogen peroxide because the preferred propellants for that vehicle would be propane and 70% hydrogen peroxide.

Because all of the CO would be oxidized to CO_2, no criteria pollutants would be emitted by the reusable suborbital rockets. In addition, no hazardous air pollutants would be emitted by the reusable suborbital rockets. The water vapor and CO_2 that would be emitted would disperse into the atmosphere and would have no impact on air quality.

The three 5-kilowatt generators that would be operating at each control shelter would emit CO, PM_{10}, NO_X, VOCs, and SO_X, with PM_{10} and NO_X comprising the majority of the emissions. Because there would only be three relatively small generators operating at each control shelter, the emissions associated with these generators would result in a negligible impact on air quality.

The air quality impacts associated with the proposed action would not exceed one or more of the NAAQS for any of the time periods analyzed, and would not exceed the applicable threshold of significance.

Regional Haze

FAA reviewed the regional haze rule (64 Fed. Reg. 35714, dated July 1, 1999), which requires states to develop State Implementation Plans (SIPs) to address visibility at designated mandatory Class I areas, including 156 designated national parks, wilderness areas, and wildlife refuges. General features of the regional haze rule are that all states are required to prepare an emissions inventory of all haze related pollutants from all sources in all constituent counties. Haze related pollutants include volatile organic compounds (VOCs), nitrogen oxides (NO_X), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and ammonia (NH_3).
The areas that have opted to implement the Section 309 regional haze SIP option are the states of Arizona, New Mexico, Wyoming, Utah, and Oregon. The Western Regional Air Partnership (WRAP) Policy on Clean Air Corridors completed on November 13, 2002, concluded that a 25 percent increase in weighted emissions would have only a minimal impact on visibility at Class I areas on the Colorado Plateau, which includes portions of New Mexico, Utah, Colorado, and Arizona. (WRAP, 2002) The minimal emissions of the haze related pollutants associated with the

proposed action (i.e., PM_{10}, $PM_{2.5}$) would have a negligible direct and indirect impact on the visibility at the designated Class I areas.

4.1.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on air quality. The other activities associated with the X Prize Cup that may impact air quality are discussed under cumulative impacts.

4.2 Biological Resources – Fish, Wildlife, and Plants

This section addresses the potential impacts on biological resources from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the no action alternative.

4.2.1 Proposed Action

Vegetation

Under the proposed action, 13,300 square meters [139,931 square feet (~3 acres)] of disturbed desert scrub would be cleared for the construction of the three sets of three launch and landing pads, the propellant staging pad, and their associated operational area. In addition, a total of 3,941 square meters [42,380 square feet (<1 acre)] and 112 square meters (1,200 square feet) of desert scrub would be cleared for the development of access roads to the three launch and landing pad areas and the expansion of the X-Racer propellant loading pad, respectively, resulting in a total loss of 17,353 square meters [186,786 square feet (~4 acres)] of disturbed desert scrub all within the fenced-in boundary of the Las Cruces International Airport.

The reusable suborbital rocket launches would have a negligible impact on the surrounding vegetation because such vegetation is tolerant of active human disturbance associated with the active airport. The launch and landing pads would be covered with an impervious surface devoid of vegetation, and the area immediately surrounding the launch and landing pads, as well as the area in-between the launch and landing pads, would be cleared of vegetation.

Wildlife

Under the proposed action, the clearing of the vegetation and the operation of the reusable suborbital rockets would result in a negligible impact on wildlife. The area that would be disturbed is within the fenced-in boundary of the airport, and the wildlife species that exist are tolerant of the typical airport disturbances (e.g., noise, aircraft, and vehicular movements) and would avoid active construction areas.

Migratory Birds

Under the proposed action, the clearing of vegetation, ground disturbance, and construction of the new launch and landing pads and access roads would occur between early September and October

15. Adverse effects to birds, nests, or eggs of ground-nesting species protected under the Migratory Bird Treaty Act would not be likely to occur. Also, because the proposed action would occur within the actively disturbed area of the airport, and would not represent a notable change in current airport operations (commercial and general aviation activities), migratory birds protected under the MBTA would not be affected.

Threatened and Endangered Species

No known state or federally listed threatened or endangered species would be impacted by the proposed action. The area affected by the proposed action is an actively disturbed area within the fenced-in boundary of the Las Cruces International Airport and no suitable habitat or designated critical habitat for any federally-listed threatened or endangered species would be affected. The FAA is coordinating with the U.S. Fish and Wildlife Service and the New Mexico Department of Game and Fish to confirm that the proposed action would have no impact on federally-listed threatened or endangered species. A copy of the correspondence between the FAA and the U.S. Fish and Wildlife Service and the New Mexico Department of Game and Fish are included in Appendix B.

The proposed action would have no more than a negligible impact on vegetation and wildlife, and would not be likely to adversely affect threatened or endangered species or designated critical habitat. The impacts would not exceed the applicable threshold of significance.

4.2.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on biological resources. The other activities associated with the X Prize Cup that may impact biological resources are discussed under cumulative impacts.

4.3 Cultural Resources (including Historical, Architectural, and Archaeological Resources)

This section addresses the potential impacts on cultural resources from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.3.1 Proposed Action

Under the Proposed Action, the ground-disturbing activities would include the installation of nine 10-meter (33-foot) diameter launch and landing pads, a 100 square meter (1,076 square feet) propellant staging area, 646 meters (2,119 feet) of new access roads, and a 112-square meter (1,200-square foot) expansion of the existing X-Racer propellant loading area. These features would be within the fenced boundary of the Las Cruces International Airport, which has been defined as the Area of Potential Effects (APE).

In accordance with the requirements of Section 106 of the National Historic Preservation Act, the FAA has initiated consultation with the New Mexico State Historic Preservation Officer (SHPO).

As requested by the SHPO, FAA would ensure that the X Prize Foundation would survey all construction areas, access roads, and equipment staging areas and access points that are not located on existing parking areas or access points. FAA would submit the results of the survey to the SHPO, and where possible, all potential historic properties identified would be avoided by relocating a pad or access road. The FAA will include this information in the results submitted to the SHPO, and will not complete the NEPA process until obtaining the SHPO's concurrence on FAA's determination that there would be no adverse effects to listed or eligible properties or other cultural resources. If all eligible and potential eligible historic properties for listing on the National Register of Historic Places were avoided through relocation of a pad or access road, then there would be no significant impact to cultural resources. A copy of the correspondence between the FAA and the New Mexico Historic Preservation Division is included in Appendix B.

4.3.2 No Action Alternative

Under the no action alternative, FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on cultural resources. The other activities associated with the X Prize Cup that may impact cultural resources are discussed under cumulative impacts.

4.4 Geology and Soils

This section addresses the potential impacts on geology and soils from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.4.1 Proposed Action

The proposed launch, landing, and propellant staging pads would not be anchored into the bedrock; therefore geology would not be impacted. The construction of the proposed launch and landing pads would result in both short- and long-term impacts on soils. The short-term impacts would include the potential for increased erosion during construction, while the long-term soil impacts would include compaction and mixing of soil horizons. The short- and long-term impacts on soil from construction would be negligible. Best Management Practices as promoted by the New Mexico Water Quality Control Commission would be used, which include the use of silt fences, check dams, and earthen dikes to reduce sedimentation of surface waters and reduce soil erosion.

Potential propellant spills and releases represent a potential impact on soils in the form of soil contamination. Because all spills and releases would be small, based on the capacity of the reusable suborbital rockets, and would be immediately contained, removed, and remediated by trained personnel, such impacts would be considered negligible. Potential impacts from hazardous materials and hazardous wastes are addressed in Section 4.5.

4.4.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on geology or soils. The other

activities associated with the X Prize Cup that may impact geology and soils are discussed under cumulative impacts.

4.5 Hazardous Materials and Hazardous Waste Management (including Solid Waste, Pollution Prevention, and Natural Resources and Energy Supply)

This section addresses the potential impacts associated with hazardous materials and hazardous waste management from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.5.1 Proposed Action

During pre-flight activities, minor amounts of other hazardous materials, such as oils, lubricants, and solvents, would be used to prepare the rockets for flight. All hazardous materials would be handled, stored, and used in compliance with all applicable regulations. Hazardous materials that would be used under the proposed action are similar to materials already handled at the Airport. The transport, use, or disposal of hazardous materials associated with operations under the proposed action would not pose a substantial hazard to the public or the environment.

The reusable suborbital rockets would use propellants with hazardous characteristics similar to the jet fuels currently used and stored at the Las Cruces International Airport. Fuels and oxidizers would be stored in separate, secured containers in covered airport hangars. During the Vertical Rocket Challenge and Lunar Lander Challenge events, applicant-specific propellant trucks would leave the storage area and proceed to the launch/landing pad area, remain there during operations (at a safe distance), and would return to the storage area after the applicant completes the event.

Propellant fueling operations would occur at the launch pad and would involve trained personnel. In the event of a spill, the applicant's personnel would be trained to respond to such an incident and would be responsible for any necessary containment, removal, and remediation. In addition, emergency response and the local fire department would be on standby during the X Prize Cup to respond to accidents or fires. Dry powder fire suppression equipment would be present during all propellant loading operations.

The proposed action is not anticipated to result in problems with respect to meeting the applicable laws and regulations on hazardous materials or hazardous or solid waste management, and is not anticipated to result in any impacts from hazardous materials, hazardous waste or solid waste.

Applicants will be required to comply with pollution prevention plans and practices in effect at the airport. The use of natural resources and energy associated with the proposed action would have no impacts on energy demands or other natural resource consumption.

4.5.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no hazardous waste or hazardous material management impacts. The other activities associated with the X Prize Cup that may result in

hazardous waste or hazardous material management impacts are discussed under cumulative impacts.

4.6 Health and Safety

This section addresses the potential impacts on health and safety from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.6.1 Proposed Action

Implementation of the proposed action would result in a negligible impact on health and safety. All transport of hazardous materials, including fuels and oxidizers, to the Las Cruces International Airport would be in DOT approved packages and containers. The shipments would meet the DOT requirements including packaging design, marking, labeling, and placarding for shipment over public roadways. All hazardous materials transportation would meet DOT Hazardous Materials Regulations, 49 CFR Parts 171, 172, 173, 174, 175, 176, and 177. These DOT requirements are intended to minimize potential releases, fires, and explosions.

Trained ground crew personnel would follow established standard operating procedures during fueling operations in accordance with all applicable safety regulations including OSHA 29 CFR 1910.106, Flammable and Combustible Liquids. Spills of hazardous materials would be handled by trained ground crew personnel. An emergency response team would be available if necessary during a release or spill incident.

The location of the public spectator area would be located more than 1 kilometer (3,281 feet) from the nearest set of launch and landing pads that would be used during the Vertical Rocket Challenge or the Lunar Lander Challenge. The 1-kilometer (3,281-foot) distance would be the safety zone, designated to contain the effects of a failed operation. Each reusable suborbital rocket would have an autonomous and human controlled termination system that would be activated should the vehicle leave the designated operational area, preventing any errant suborbital rockets, debris, or failed operations from reaching the spectator area. In addition, the vehicle operators would be located in a portable steel shelter (safety bunker) located near each set of launch and landing pads. Emergency response and the local fire department would be on standby during each launch to respond to accidents or fires.

No adverse impacts on health and safety are anticipated to result from the proposed action.

4.6.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no health and safety impacts. The other activities associated with the X Prize Cup that may result in health and safety impacts are discussed under cumulative impacts.

4.7 Land Use (including Department of Transportation 4(f) Resources and Farmlands)

This section addresses the potential impacts on land use from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.7.1 Proposed Action

Under the proposed action, 4,860 square meters [52,310 square feet (~1.2 acres)] of undeveloped land at the Las Cruces International Airport would be developed for the 9 new launch and landing pads, propellant staging pad, and associated access roads. This would have no effect on the existing land use at the airport or surrounding the airport. Implementation of the proposed action would not require the use or alteration of any land protected under Section 4(f) of the Department of Transportation Act or under the Farmland Protection Policy Act. A copy of the correspondence between the FAA and the NRCS is included in Appendix B.

4.7.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no land use impacts. The other activities associated with the X Prize Cup that may result in land use impacts are discussed under cumulative impacts.

4.8 Noise and Compatible Land Use

This section addresses the potential impacts associated with noise from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.8.1 Proposed Action

The operation of the rocket engines would result in short-term increases in the level of noise at the Las Cruces International Airport above the peak levels associated with the fix- and rotary-wing aircraft stationed at the airport. The 75 dB to 60 dB DNL contours are wholly contained within airport property, and no noise sensitive receptors exist in the area around the airport. Other than the spectators that would come to the X Prize Cup and the airport employees, there are no sensitive noise receptors near the airport. Because the location of the launch and landing pads would be more than 1 kilometer (3,281 feet) away from the spectators and administrative area of the Las Cruces International Airport and the rocket engines would only operate for brief periods of time (up to 4 minutes), the elevated levels of noise would not be expected to adversely affect spectators or employees. The proposed action would not result in an increase in noise in excess of the applicable thresholds of significance for noise or land use compatibility.

4.8.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or

associated construction or transport activities and no noise impacts. The other activities associated with the X Prize Cup that may result in noise impacts are discussed under cumulative impacts.

4.9 Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks (including Secondary (Induced) Impacts)

This section addresses the potential impacts on socioeconomic and environmental justice issues and children's health and safety risks from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.9.1 Proposed Action

Per the totals from the previous X Prize Cup hosted at the Las Cruces International Airport, the proposed action would create an influx of no more than 25,000 people for the entire two-day X Prize Cup, with no more than 10,000 people per day in attendance.

Approximately 230 employees would be required to host the X Prize Cup, and approximately 250 exhibitors would attend the event. Based on the expected number of spectators and personnel required to support the X Prize Cup, Doña Ana County would experience positive impacts to socioeconomics. The additional services provided to the spectators and personnel would provide a temporary benefit to the local economy because of the increase in the amount of business conducted by the service industry, such as hotels, restaurants, and gas stations. The temporary increase in the local population would not exceed the service capacity of the region in terms of lodging or services (public utilities or emergency care).

Because Doña Ana County has a zoning ordinance that restricts residential development within a 4 kilometer (2.5 mile) radius of the Las Cruces International Airport, there would be no adverse impacts on socioeconomics, environmental justice populations or on children's health and safety by the proposed action. (Las Cruces International Airport, 1997)

Because the proposed action does not involve major development, it would not involve the potential for induced or secondary impacts on surrounding communities.

4.9.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no socioeconomic impacts. The other activities associated with the X Prize Cup that may result in socioeconomic impacts are discussed under cumulative impacts.

4.10 Transportation

This section addresses the potential impacts on transportation from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.10.1 Proposed Action

Under the proposed action, the influx of up to 10,000 spectators would result in increases in traffic congestion on the local roadways around the Las Cruces International Airport; however, there would be no notable travel delays associated with travel on the Interstate Highways (I-10 and I-15). The range of average daily traffic on the Interstates (5,000 to 18,000 passenger cars and trucks per day) and the increase in traffic associated with the spectators may result in a change in interstate level of service from level A to level B. A change from level A to level B is a change from a free flow condition where individual users are unaffected by the presence of others in the traffic stream to a stable traffic stream where individual users begin to notice others. Such a change would be a negligible change in the traffic flow on I-10. (Transportation Research Board, 1992)

4.10.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no transportation impacts. The other activities associated with the X Prize Cup that may result in transportation impacts are discussed under cumulative impacts.

4.11 Visual Resources (including Light Emissions and Visual Impacts)

This section addresses the potential impacts on visual resources from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.11.1 Proposed Action

Implementation of the proposed action would result in no change of the visual resources associated with the Las Cruces International Airport. The reusable suborbital launch vehicles would remain within 200 meters (656 feet) of the ground, would be similar in size to fix-wing and rotary-wing aircraft that operate out of the airport, and any emission clouds would disperse within a short period of time. The visual sight of launch vehicles and emission clouds would not constitute an adverse impact. There is no lighting associated with the proposed action which would be expected to create an annoyance among people in the vicinity or interfere with their normal activities. The proposed action is not expected to have any impacts on visual resources from light emissions or other visual impacts.

4.11.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no visual resource impacts. The other activities associated with the X Prize Cup that may result in visual resource impacts are discussed under cumulative impacts.

4.12 Water Resources (including Water Quality, Coastal Resources, Wild and Scenic Rivers, Wetlands and Floodplains)

This section addresses the potential impacts on water resources, including wetlands and floodplains, from the suborbital launch activities associated with the Lunar Lander Challenge at the 2006 X Prize Cup and under the No Action Alternative.

4.12.1 Proposed Action

Implementation of the proposed action would have no impact on water resources. No streams, wetlands, or floodplains are located within the proposed operational area of the reusable suborbital rockets, which includes the location of all the proposed launch and landing pads. The proposed action would not impact any surface water or groundwater resources. In addition, existing municipal water supply sources would be used for all the X Prize Cup activities. The use of municipal water supplies is not anticipated to have any discernible impact on those sources.

4.12.2 No Action Alternative

Under the no action alternative, the FAA would not issue any experimental permits or approve the revised Airport Layout Plan; therefore, there would be no launches of reusable suborbital rockets or associated construction or transport activities and no impacts on water resources. The other activities associated with the X Prize Cup that may result in impacts on water resources are discussed under cumulative impacts.

4.13 Cumulative Impacts

According to 40 CFR § 1508.7, cumulative impacts are defined as "…the incremental impact of the actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions." For this analysis, cumulative impacts include impacts from the permitted vehicles that would participate in the Vertical Launch Challenge and the Lunar Landing Challenge events and the past, present, and reasonably foreseeable future activities that would affect the resources impacted by the events and would at the Las Cruces International Airport. The FAA also reviewed the projects found on the City of Las Cruces Planning Department web page, http://www.las-cruces.org/cd/planning_services-default.shtm, and found that no projects are planned in the immediate vicinity of the Las Cruces International Airport. The past, present, and reasonably foreseeable future activities reviewed by the FAA include the X Prize Cup events that would occur, as presented in Section 1.1, Background, and discussed in detail below.

The X-Racer will fly up to four times per day during the two-day X Prize Cup. The rocket motor propellants for the X-Racer consist of LOX and kerosene and have a burn time of about four minutes. Up to 12 launches of six amateur rockets will occur throughout the two-day X Prize Cup. The amateur rockets (Tripoli rockets) do not require a license or permit from the FAA. A 10-meter (33-foot) diameter (circular or octagonal) launch area will be located on an existing road (see Exhibit 2-4) for the amateur rocket launches. The amateur rocket recovery area will be on land managed by the Bureau of Land Management (BLM); the X Prize Foundation will obtain authorization from BLM to use the recovery area.

Up to six different rocket engines will be fired at the existing static rocket engine test pad. The propellants of the six different rocket engines are similar to propellants of the reusable suborbital rockets described under the proposed action. Each rocket engine may be fired two times each day for up to 30 seconds each, for a total rocket engine operating time of six minutes.

Up to 1,000 model rockets will be launched either at or adjacent to the Las Cruces International Airport. The location and layout of the model rocket launches will be large enough and designed to accommodate the recovery of the model rockets (i.e., a separate recovery area will not be required).

The rocket truck would be provided by Orion Propulsion and would consist of a 2,000 pound thrust hybrid rocket engine fueled by nitrous oxide and asphalt mounted in the bed of a pick-up truck.

The Elevator Games will include a cable tensile strength competition, where competitors provide a segment of cable that is tested and the cable with the highest tensile strength wins the competition. In addition, the Elevator Games will include a rope-climbing event in which a remotely powered climbing vehicle ascends a 61-meter (200-foot) rope suspended by a crane. The power for the climbing vehicle is provided from a microwave or laser beam directed at the climbing vehicle. The climbing vehicle that ascends the rope the fastest wins the competition.

Because limited parking is available at the Las Cruces International Airport, additional offsite parking may be available at the Southern New Mexico State Fairgrounds located approximately 3.2 kilometers (2 miles) west of the airport off of I-10. Shuttle service will be provided between the fairgrounds and the airport.

The FAA reviewed the activities associated with the proposed action to identify the resources that may be notably affected by the implementation of the proposed action and then assessed the impacts from the other past, present, and reasonably foreseeable future activities that may impact the same resources. The FAA found that the proposed action may have impacts which would not exceed the applicable thresholds of significance for

- Air Quality,
- Biological Resources, or
- Health and Safety.

For the other impact categories, the impacts were found to be negligible or non-existent and would not result in a notable cumulative impact when assessed with other past, present, and reasonably foreseeable future activities.

4.13.1 Cumulative Impacts on Air Quality

In addition to the air quality impacts discussed under the proposed action, the other X Prize Cup activities would result in emissions of criteria air pollutants, Hazardous Air Pollutants (air toxics), and air pollutants regulated by New Mexico. The X-Racer rocket engine operation, the operation of rocket motors with solid propellant (the amateur rockets), the static firing of rocket engines, the operation of the rocket powered truck, and up to 1,000 launches of model rockets would emit water, carbon dioxide, and criteria air pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_X, SO_X, and CO). In addition, the

operation of the amateur rockets would result in emissions of hydrogen chloride and aluminum oxide. Hydrogen chloride is a hazardous air pollutant regulated by the U.S. Environmental Protection Agency, and aluminum oxide is a toxic air pollutant regulated by New Mexico per 20.2.72 New Mexico Administrative Code Section 402.B.

The cumulative total emissions of any individual criteria pollutant (i.e., CO, PM_{10}, NO_X, VOCs, and SO_X) would be less than 2 tons (4,000 pounds), which would readily disperse resulting in a negligible cumulative impact on regional air quality. Because the emissions of aluminum oxide and hydrogen chloride would be from the amateur rockets that would be launched from a temporary launch pad, the emissions would not be generated from a regulated source, and, therefore would not be subject to U.S. EPA or New Mexico regulations. However, the emissions of hydrogen chloride and aluminum oxide would be up to 0.93 kilograms (2.04 pounds) and 1.68 kilograms (3.7 pounds), respectively, per launch. This amount of emissions would be from ground level up to approximately 914 meters (3,000 feet) above ground level and would readily disperse. Because a maximum of 12 launches of amateur rockets would occur over a 2-day period and the amount of hydrogen chloride and aluminum oxide emitted would be small and would readily disperse, the impact on the regional air quality would be a negligible.

The cumulative impact of the emissions of all the activities occurring at the X Prize Cup would be negligible. The reusable suborbital rockets and the rockets engines that would be operated on the test stand would use similar types of propellants resulting in emissions of water and CO_2; however, the total amount would be less than double that presented in Exhibit 4-2 because the number of static firings and the duration would be less than the number and duration of the rocket engine operation time of the Vertical Launch Challenge and the Lunar Lander Challenge. In addition, the operation of the static test stand and the Vertical Launch Challenge and the Lunar Lander Challenge would not occur at the same time; therefore, the emissions from one event would dissipate prior to the initiation of the next event and a new emission source.

4.13.2 Cumulative Impacts on Biological Resources

The X-Racer would take off from an existing runway and would maintain a flight plan typical of a fixed-wing aircraft operating from the airport and would not represent a new impact on the existing biological resources. The static testing of rocket engines would occur from an existing test pad and would not represent a new impact on the existing biological resources. The rocket truck would operate along the existing apron or runway and would not represent a new impact on the existing biological resources. The amateur rocket launches would occur from a temporary launch pad placed on an existing road, and the X Prize Foundation is in consultation with the BLM to obtain the appropriate land use permit for a rocket recovery area and access to the area. The landing of the amateur rockets and the off-road access to the landing area would result in a negligible short-term impact on vegetation and wildlife in the area. The launch of the model rockets would occur in a cleared area suitable for launch and recovery and would not impact vegetation or wildlife. These activities would result in a negligible cumulative impact on biological resources.

4.13.3 Cumulative Impacts on Health and Safety

Because the same transportation and operation measures associated with the proposed action would be implemented for the other activities occurring during the X Prize Cup, there would be no

additional cumulative health and safety impacts. In addition, for the elevator games that involve the use of a laser or microwave beam, the beam would be directed at a specific target away from the spectators or any sensitive receptors; therefore, there would no cumulative health and safety impact.

4.13.4 Cumulative Impacts on Land Use

Existing cleared areas at the airport or adjacent to the airport would be used for the launch and recovery of model rockets. These actions would have no cumulative effect on the existing land use at the airport or surrounding the airport. The X Prize Foundation would have to obtain written authorization to use and access BLM land for the landing and recovery of the amateur rockets.

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5 MITIGATION

The environmental impact analysis in this EA found no impacts in excess of applicable thresholds of significance for any impact categories. Therefore, no mitigation is necessary. However, to ensure the health and safety of participants, spectators, and airport staff, FAA recommends that the X Prize Foundation implement the following noise protection measures and monitoring during the X Prize Cup:

- Post noise information posters that inform the public spectators of the potential noise hazards.
- Ensure that noise protection devices (e.g., ear plugs) would be available during the X Prize Cup.
- Monitor the level of noise at the perimeter of the spectator area during rocket engine operation.
- Provide noise monitoring summary report to FAA to include the activity(ies), location(s), duration, date, time of day, weather condition, and recorded noise level in "A" weighted decibels (dBA).

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APPENDIX A
DESCRIPTION OF REUSABLE SUBORBITAL ROCKETS

This appendix provides a brief description of the reusable suborbital rockets that may participate in the Vertical Take-off Challenge and the Lunar Lander Challenge at the 2006 X Prize Cup. The information is based on experimental permit applications submitted to the FAA by the applicants as of June 22, 2006. Some details of the rockets may change before the actual competition; however, the propellant types, maximum propellant amounts, general operation and control systems, and transportation and propellant loading operation plans that comprise the basis of the analysis in this EA are likely to remain constant.

This appendix presents general information on the vehicles and propellant systems proposed for each suborbital rocket, the general operations and control systems, and the transportation and propellant loading steps for each applicant seeking to participate in the Lunar Lander Challenge.

A.1 Acuity Technologies

Exhibit A-1 describes the proposed propellant system types and quantities as well and the number of engines and a general size and weight of the suborbital rocket proposed by Acuity Technologies.

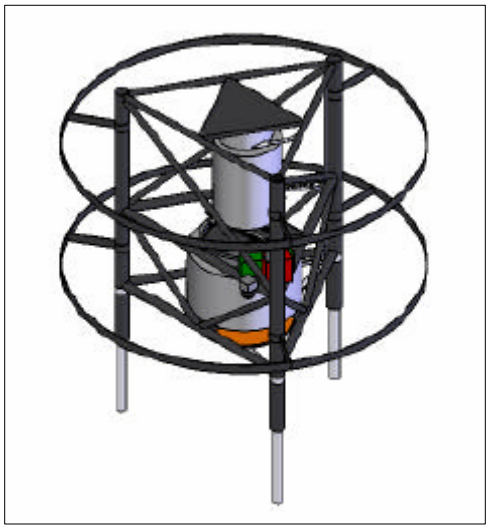
Exhibit A-1. General Vehicle and Propellant System Information for Acuity Technologies

Potential Propellants (fuel and oxidizer combination)	**Amount**		**Number of Rocket Engines and Thrust** Newtons (pounds-force)	**Height** meters (feet)	**Diameter** meters (feet)	**Gross Weight** kilograms (pounds)
	kilograms	pounds				
70% Hydrogen peroxide	150	330	1 rocket engine 2,447 (550)	2 (7.2)	2 (6.7)	227 (500)
Propane	16	35				
70% Hydrogen peroxide	150	330				
JP-5	16	35				
70% Hydrogen peroxide	150	330				
RP-1	16	35				

Note: The proposed propellant is 70% Hydrogen peroxide and propane.

Exhibit A-2 depicts an artist rendering of the proposed Acuity Technologies suborbital rocket.

Exhibit A-2. Acuity Technologies Proposed Rocket



General Operation and Control Systems

The Acuity Technologies suborbital rocket would be unmanned, takeoff vertically and reach a maximum altitude of 100 meters (330 feet), and would use a full powered vertical landing. The ground support operations would require a crew of at least four persons and employ the following support equipment: radio control transceiver, two radio frequency video receivers, two video monitors, a laptop computer, and a loud speaker. The launch sequence would be performed remotely and/or under flight computer control and would include opening fuel and oxidizer valves to minimum thrust settings, spark ignition and stabilization, and throttle up to takeoff thrust. Flight would include a combination of autonomous on board and human controlled operations. For flight termination, the reusable suborbital rocket would include altitude control, throttle control, and separate switches for the main fuel and oxidizer valves.

Transportation and Propellant Loading

The Acuity Technologies reusable suborbital rocket would be transported by van/truck and trailer. The propellants would be transported in Department of Transportation (DOT) approved tanks and cylinders. Specifically the propane, JP-5 or RP-1 fuel would be transported in a storage tank (e.g., standard propane tank such as used on recreational vehicles). The hydrogen peroxide would be transported in industrial gas cylinders and tanks as appropriate.

The propellant loading sequence would be as follows: first oxidizer would be loaded, followed by fuel loading, and then cooling water, and finally the ignition source would be loaded into the reusable suborbital rocket. The oxidizer would be loaded from the ground storage cylinder or tank to the rocket's oxidizer tank. The fuel would be pump or gravity loaded into the rocket's tank from the ground storage tank. Nine kilograms (20 pounds) of water used for cooling would be transferred to the reusable suborbital rocket. The ignition source includes 118 milliliters (4 ounces) of butane and 237 milliliters (8 ounces) of nitrous oxide (N_2O). Following propellant

and other material loading, the ground crew and support vehicles would exit the immediate launch area.

A.2 Armadillo Aerospace

Exhibit A-3 describes the proposed propellant system types and quantities, the number of engines, and a general size and weight of the suborbital rocket proposed by Armadillo Aerospace.

Exhibit A-3. General Vehicle and Propellant System Information for Armadillo Aerospace

Potential Propellants (fuel and oxidizer combination)	**Amount**		**Number of Rocket Engines and Thrust** Newtons (pounds-force)	**Height** meters (feet)	**Diameter** meters (feet)	**Gross Weight** kilograms (pounds)
	kilograms	pounds				
Large Prototype Vehicle						
Ethanol	304	670	1 rocket engine 13,000 (3,000)	6 (19.5)	1 (3)	1,065 (2,345)
LOX	435	960				
Lunar Lander Analog Quad						
Ethanol	415	915	1 rocket engine 20,000 (4,500)	1.5 (5)	2.8 (9.3)	1,295 (2,855)
LOX	585	1,290				

Exhibits A-4 and A-5 provide views of the Armadillo Aerospace suborbital rockets. Exhibit A-4 depicts the Lunar Lander Analog Quad and Exhibit A-5 shows a photograph of their Large Prototype Vehicle.

Exhibit A-4. Armadillo Aerospace Lunar Lander Analog Quad

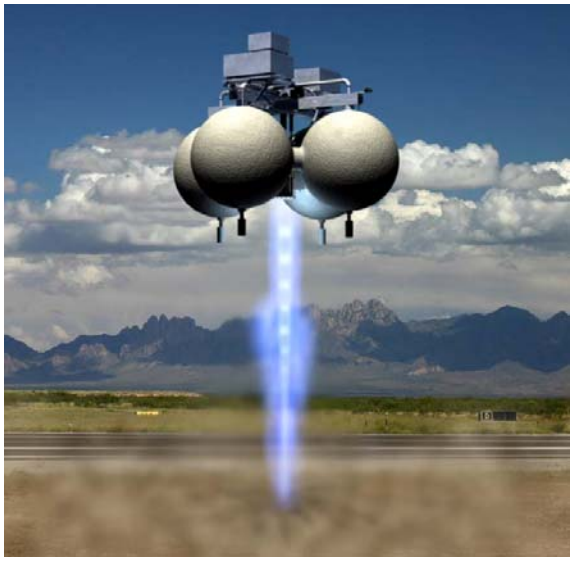


Exhibit A-5. Armadillo Aerospace Large Prototype Vehicle

General Operation and Control Systems

The Armadillo Aerospace suborbital rockets would each be unmanned, take off vertically reaching a maximum altitude of 51 meters (166 feet), and would each use a full powered vertical landing. A ground support crew of five persons would be required for each rocket, totaling 10 ground support crew.

Transportation and Propellant Loading

The Armadillo Aerospace suborbital rockets would be transported by van/truck and trailer. Propellants would be transported by truck. LOX would likely be transported via commercial tank truck or in dewars loaded on a truck or trailer. Ethanol would be transported in a tank truck or drums loaded on a trailer or pickup truck. Ethanol loading equipment would include transfer plumbing and pumps. LOX loading would be measured by weighing the amount of LOX transferred or by completely loading a known mass of LOX.

Propellant loading would start with 1) transfer of ethanol via a quick connect hose and modest overpressure for transfer; 2) loading LOX via hose and pressurizing the LOX dewar with helium; and 3) transfer of helium via a high pressure line after ethanol and LOX transfers are complete and tanks are sealed. Helium transfer equipment would include a high-pressure fill line that has a built in orifice to slow down the pressurization process to prevent excess heat buildup.

A.3 Masten Space Systems

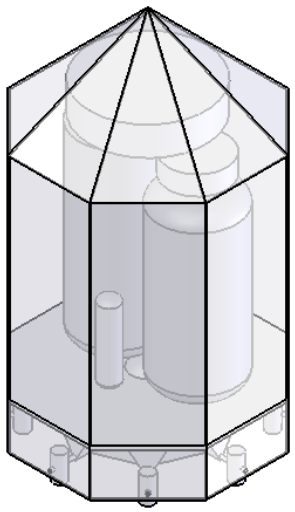
Exhibit A-6 describes the proposed propellant system types and quantities, the number of engines, and a general size and weight of the suborbital rocket proposed by Masten Space Systems.

Exhibit A-6. General Vehicle and Propellant System Information for Masten Space Systems

Potential Propellants (fuel and oxidizer combination)	**Amount**		**Number of Rocket Engines and Thrust** Newtons (pounds-force)	**Height** meters (feet)	**Diameter** meters (feet)	**Gross Weight** kilograms (pounds)
	kilograms	pounds				
Isopropanol	265	585	8 rocket engines 2,224 (500) each	2.3 (7.7)	1.6 (5.5)	1,451 (3,200)
LOX	442	975				

Exhibit A-7 depicts the Masten Space Systems XL 0.1 Vehicle.

Exhibit A-7. Masten XL 0.1 Vehicle



General Operation and Control Systems

The Masten Space Systems XL 0.1 suborbital rocket would be unmanned, take of vertically, reach a maximum altitude of 60 meters (197 feet), and use a full powered vertical landing. The ground operations would require a ground support crew of three to five persons and the ground support control systems include laptop computers and radio transceivers for wireless networking/communication, and thrust termination control.

The control operator would have remote control of the suborbital rocket and would use visual verification of the planned trajectory as well as real-time global positioning system and telemetry. Operator withdrawal would result in activation of an "auto land" feature that provides

a set descent velocity with zero translational movement. Both the control operator and test safety officer can activate the thrust termination system if vehicle exceeds operational parameters.

Transportation and Propellant Loading

The Masten reusable suborbital rocket would be transported by van/truck and trailer and moved from the truck to the launch pad with dollies, forklift and/or crane. Propellants would be transported to the site by truck. LOX would be transported in a commercial tank truck or LOX dewars loaded on to a truck or trailer. Isopropanol would be transported in a tank truck or 208-liter (55-gallon) drums loaded on a trailer or pickup truck.

Propellant loading equipment would include transfer plumbing and pumps. Pressurant transfer equipment would include standard industrial pressure bottles (T-bottles) of helium and/or nitrogen gas, liquid nitrogen dewar. Propellant loading would be done in the following order: 1) isopropyl alcohol, 2) pressurants, and 3) LOX. The propellants and pressurants each would be brought up to the suborbital rocket separately, the transfer completed, and equipment removed before the subsequent material is brought to the rocket. Post-flight any remaining LOX would be flash boiled, vented, and purged; then any remaining isopropyl alcohol would be drained into a suitable container and the system purged; finally any remaining pressurant gases would be vented.

A.4 Microspace

Exhibit A-8 describes the proposed propellant system types and quantities, the number of engines, and a general size and weight of the suborbital rocket proposed by Microspace. There is no depiction of the Microspace suborbital rocket available.

Exhibit A-8. General Vehicle and Propellant System Information for Microspace

Potential Propellants (fuel and oxidizer combination)	**Amount**		**Number of Rocket Engines and Thrust** Newtons (pounds-force)	**Height** meters (feet)	**Diameter** meters (feet)	**Gross Weight** kilograms (pounds)
	kilograms	pounds				
50% Hydrogen peroxide	91	200	2 rocket engines 1,334 (300) each	1.8 (6)	2.1 (7)	136 (300)
Methanol	15	32				

General Operation and Control Systems

The Microspace suborbital rocket would be unmanned, take of vertically, reach a maximum altitude of 183 meters (600 feet), and would land under full power. The vehicle would require a ground support crew of less than 10 persons. Ground control systems include several radio antennas positioned for control, data reception and tracking.

Transportation and Propellant Loading

The Microspace reusable suborbital rocket would be transported by van/truck and trailer and moved from the truck to the launch pad. Ambient temperature propellants would be transferred to the vehicle one hour before the launch (with refueling during a shorter interval when required).

Approximately 907 grams (2 pounds) of liquid CO_2 would be used to pressurize the system and 907 grams (2 pounds) of potassium permanganate or sodium permanganate catalyst solution would be used for rocket ignition.

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APPENDIX B
AGENCY CONSULTATION LETTERS

U.S. Department
of Transportation
**Federal Aviation
Administration**

Commercial Space Transportation
800 Independence Ave., SW.
Washington, DC 20591

JUL 10 2006

Ms. Susan MacMullin
U.S. Fish and Wildlife Service, Field Supervisor
New Mexico Ecological Services Office
2105 Osuna Road NE
Albuquerque, NM 87113

Dear Ms. MacMullin:

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation is evaluating experimental permit applications for rocket developers proposing to launch reusable suborbital rockets for the X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge at the Las Cruces International Airport in Doña Ana County, New Mexico (see Enclosures 1, 2, and 3). Launch and landing pads and access roads would be constructed to support the launches. The FAA would issue up to five experimental permits for the operation of 10 suborbital rockets. The Las Cruces International Airport will host the X Prize Cup from October 20 through 22, 2006. The FAA has determined that the issuance of the experimental permits to the rocket developers seeking to participate in the Vertical Rocket Challenge or the Lunar Lander Challenge is subject to Section 7 of the Endangered Species Act and the National Environmental Policy Act (NEPA).

In accordance with Section 7 of the Endangered Species Act, the FAA is initiating informal consultation with the U.S. Fish and Wildlife Service (USFWS). The FAA reviewed the U.S. FWS Endangered Species List available online at http://www.fws.gov/ifw2es/endangeredspecies/lists/ListSpecies.cfm and the New Mexico Department of Game and Fish (NMDGF), Biota Information System of New Mexico (BISON-M) available at http://nhnm.unm.edu/bisonm/bisonquery.php (see Enclosure 4). The FAA is requesting your comments and/or concurrence that the species presented in Enclosure 4 is the current list of federally listed species that occur in Doña Ana County, and that no designated critical habitat for these species is found within the proposed project area. In addition, the FAA is requesting reported occurrences of any federally listed species within one mile of the Las Cruces International Airport.

The FAA is preparing an Environmental Assessment (EA) in accordance with NEPA to evaluate the potential environmental impacts associated with the issuance of up to five experimental permits. All the activities associated with the issuance of the experimental permits would occur within the Las Cruces International Airport property boundary and would include:

- Construction of nine 10-meter diameter (circular or octagonal) launch and landing pads
- Construction of three access roads

  - Access roads for the eastern and western LLC/VTC zones would be short spurs off of the existing airport perimeter road
  - The access road for the northern LLC/VTC zone would run from the cross-area of the runways out to the pads
- A week of static test firing and test flights (no more than five minutes of rocket engine operation per day)
- One day of suborbital rocket flights between the launch and landing pads (all flights would be less than four minutes in duration and less than 3,000 feet in altitude)

In addition to the Lunar Lander Challenge, the X Prize Cup will feature a number of other activities including:

- X-Racer flights (a rocket powered airplane operating under an FAA Experimental Airworthiness Certificate) up to 4 times a day during the two-day X Prize Cup
- Enlargement of the X-racer fueling pad from 400 square feet to 1,600 square feet
- Up to 1,000 Estes model rocket launches (https://www.estesrockets.com)
- Up to 12 launches of six amateur rockets from temporary launch rail placed on an existing road, operating under FAA Part 101 airspace waivers
- Static firing of up to six rocket engines
- The Elevator Games (a cable tensile strength test and a remotely powered rope-climbing vehicle race)

Unless otherwise noted, these activities do not require the issuance of permits or licenses by the FAA; therefore, FAA has no jurisdiction or authority to regulate such activities.

Please note that you will be provided with a copy of the Draft EA, upon completion, for review and comment. Thank you for your assistance in this matter. If you require further information to complete this request, please contact me directly at (202) 267-9305.

Sincerely,

Stacey M. Zee

Stacey M. Zee
Environmental Specialist, AST-100

Enclosures

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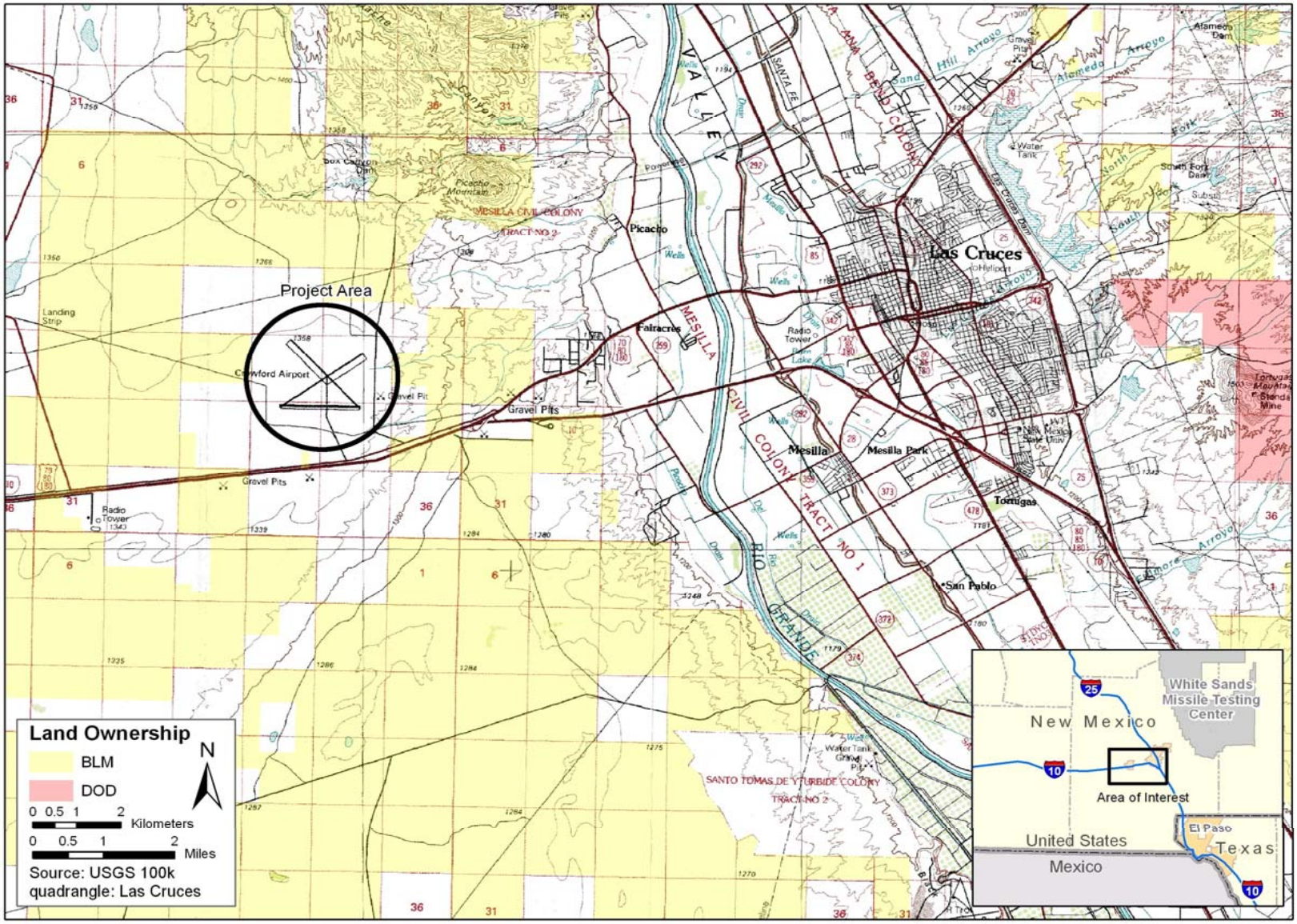

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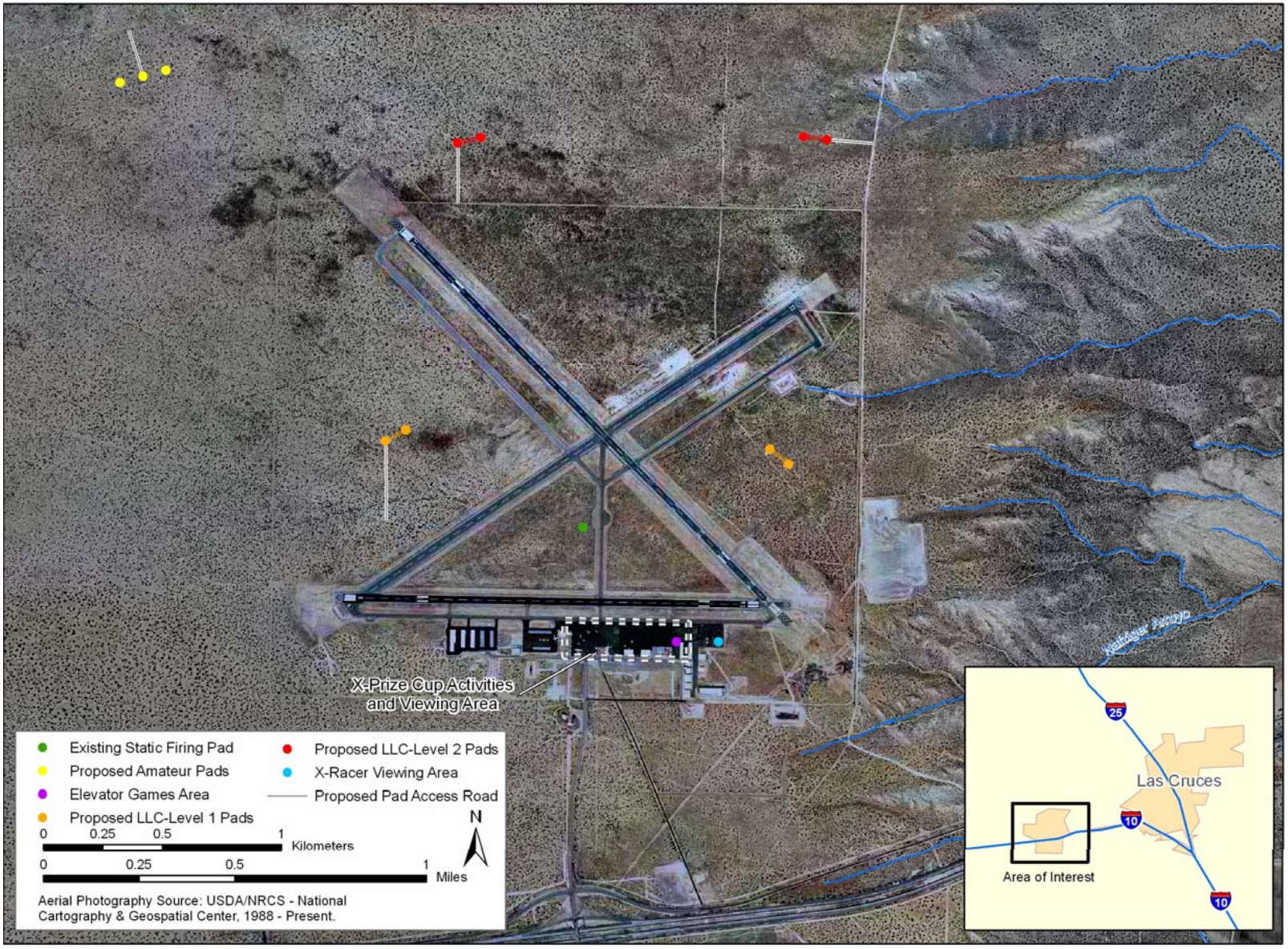

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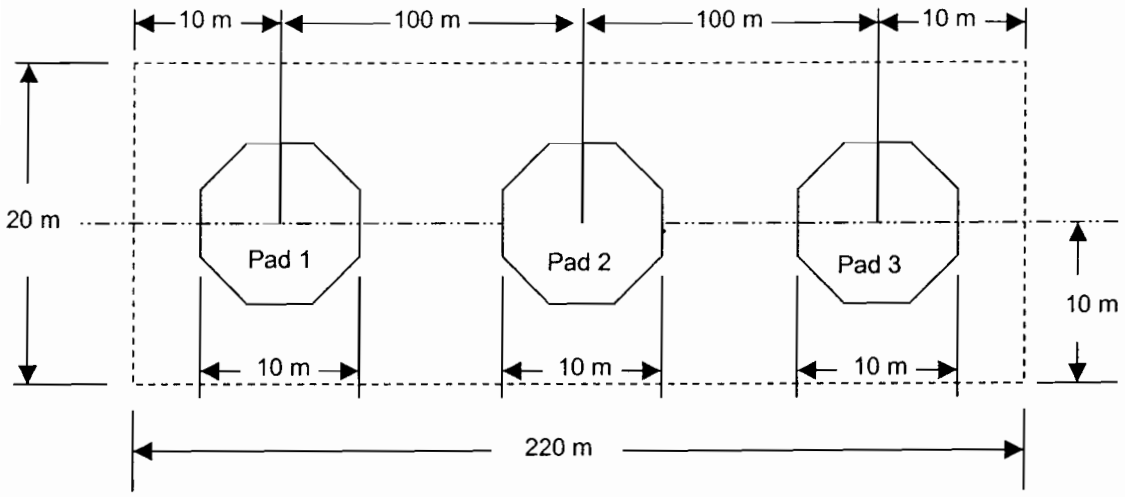

Enclosure 4. Threatened and Endangered Species in Doña Ana County, New Mexico

Common Name	Scientific Name	Federal Status	State Status
American peregrine falcon	*Falco peregrinus anatum*	delisted	threatened
Northern aplomado falcon	*Falco femoralis septentrionalis*	endangered	endangered
Baird's sparrow	*Ammodramus bairdii*	species of concern	threatened
Bald eagle	*Haliaeetus leucocephalus*	threatened; proposed for delisting	threatened
Bell's vireo	*Vireo bellii*	n/a	threatened
Broad-billed hummingbird	*Cynanthus latirostris magicus*	n/a	threatened
Common black-hawk	*Buteogallus anthracinus anthracinus*	n/a	threatened
Common ground dove	*Columbina passerina pallescens*	n/a	endangered
Costa's hummingbird	*Calypte costae*	n/a	threatened
Gray viero	*Vireo vicinior*	n/a	threatened
Least tern (interior pop.)	*Sterna antillarum*	endangered	endangered
Mexican spotted owl	*Strix occidentalis lucida*	threatened	sensitive
Mountain plover	*Charadrius montanus*	species of concern	sensitive
Neotropic cormorant	*Phalacrocorax brasilianus*	n/a	threatened
Varied bunting	*Passerina versicolor*	n/a	threatened
Violet-crowned hummingbird	*Amazilia violiceps ellioti*	n/a	threatened
Southwestern willow flycatcher	*Empidonax traillii extimus*	endangered	endangered
Yellow-billed cuckoo	*Coccyzus americanus*	candidate	n/a
Colorado Chipmunk	*Neotamias quadrivittatus australis*	species of concern	threatened
Desert bighorn sheep	*Ovis canadensis mexicana*	n/a	endangered
Spotted Bat	*Euderma maculatum*	n/a	threatened
Doña Ana Talussnail	*Sonorella todseni*	species of concern	threatened
Rio Grande silvery minnow	*Hybognathus amarus*	endangered	n/a
Sneed pincushion cactus	*Coryphantha sneedii var. sneedii*	endangered	n/a

Sources: Biota Information System of New Mexico, 2004; USFWS, 2006
n/a = not listed

U.S. Department
of Transportation
**Federal Aviation
Administration**

Commercial Space Transportation
800 Independence Ave., SW.
Washington, DC 20591

JUL 10 2006

Mr. Daniel Malanchuk
El Paso Regulatory Office, Chief
U.S. Army Corps of Engineers, Albuquerque District
P.O. Box 6096
Fort Bliss, TX 79906

Dear Mr. Malanchuk:

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation is evaluating experimental permit applications of rocket developers proposing to launch reusable suborbital rockets for the X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge at the Las Cruces International Airport in Doña Ana County, New Mexico (see Enclosures 1and 2). Launch and landing pads and access roads would be constructed to support the launches. The FAA would issue up to five experimental permits for the operation of 10 suborbital rockets. The Las Cruces International Airport will host the X Prize Cup from October 20 through 22, 2006. FAA-AST has determined that the issuance of the experimental permits to the applicants of the Lunar Lander Challenge is subject to Section 404 of the Clean Water Act (CWA) and the National Environmental Policy Act (NEPA).

The FAA is aware that a wetlands survey was conducted in 1998 concerning a proposed fence and maintenance road project at the Las Cruces International Airport. The FAA visited the site on April 19, 2006, reviewed the USGS Picacho Mountain, New Mexico quadrangle map and the Web Soil Survey online application provided by the National Cooperative Soil Survey and the Natural Resources Conservation Service. Based on data collected from the on site pedestrian survey and the quadrangle map, no areas that would classify as waters of the U.S. were located in the area of the proposed construction. According to the soil survey, the proposed construction sites of the launch and landing pads and access roads contain soils classified as Cacique-Cruces association and Tencee-Upton association, which are not hydric soils. Therefore, the FAA has concluded that the proposed project would not affect waters of the U.S. and would not result in the placement of fill material into wetlands. The FAA is requesting your comments and/or concurrence with these determinations.

The FAA is preparing an Environmental Assessment (EA) in accordance with NEPA to evaluate the potential environmental impacts associated with the issuance of up to five experimental permits. All the activities associated with the issuance of the experimental permits would occur within the Las Cruces International Airport property boundary and would include:

- Construction of nine 10-meter diameter (circular or octagonal) launch and landing pads (see Enclosure 3)

- Construction of three access roads
    - Access roads for the eastern and western LLC/VTC zones would be short spurs off of the existing airport perimeter road
    - The access road for the northern LLC/VTC zone would run from the cross-area of the runways to the pads
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- One day of suborbital rocket flights between the launch and landing pads (all flights would be less than four minutes in duration and less than 3,000 feet in altitude)

In addition to the Lunar Lander Challenge, the X Prize Cup will feature a number of other activities including:

- X-Racer flights (a rocket powered airplane operating under an FAA Experimental Airworthiness Certificate) up to four times per day during the two-day X Prize Cup
- Enlargement of the X-racer fueling pad from 400 square feet to 1,600 square feet
- Up to 1,000 Estes model rocket launches (https://www.estesrockets.com)
- Up to 12 launches of six amateur rockets from a temporary launch rail placed on an existing road, operating under FAA Part 101 airspace waivers
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- The Elevator Games (a cable tensile strength test and a remotely powered rope-climbing vehicle race)

Unless otherwise noted, these activities do not require the issuance of permits or licenses by the FAA; therefore, FAA has no jurisdiction or authority to regulate such activities.

Please note that you will be provided with a copy of the Draft EA, upon completion, for review and comment. Thank you for your assistance in this matter. If you require further information to complete this request, please contact me directly at (202) 267-9305.

Sincerely,

Stacey M. Zee

Stacey M. Zee
Environmental Specialist, AST-100

Enclosures

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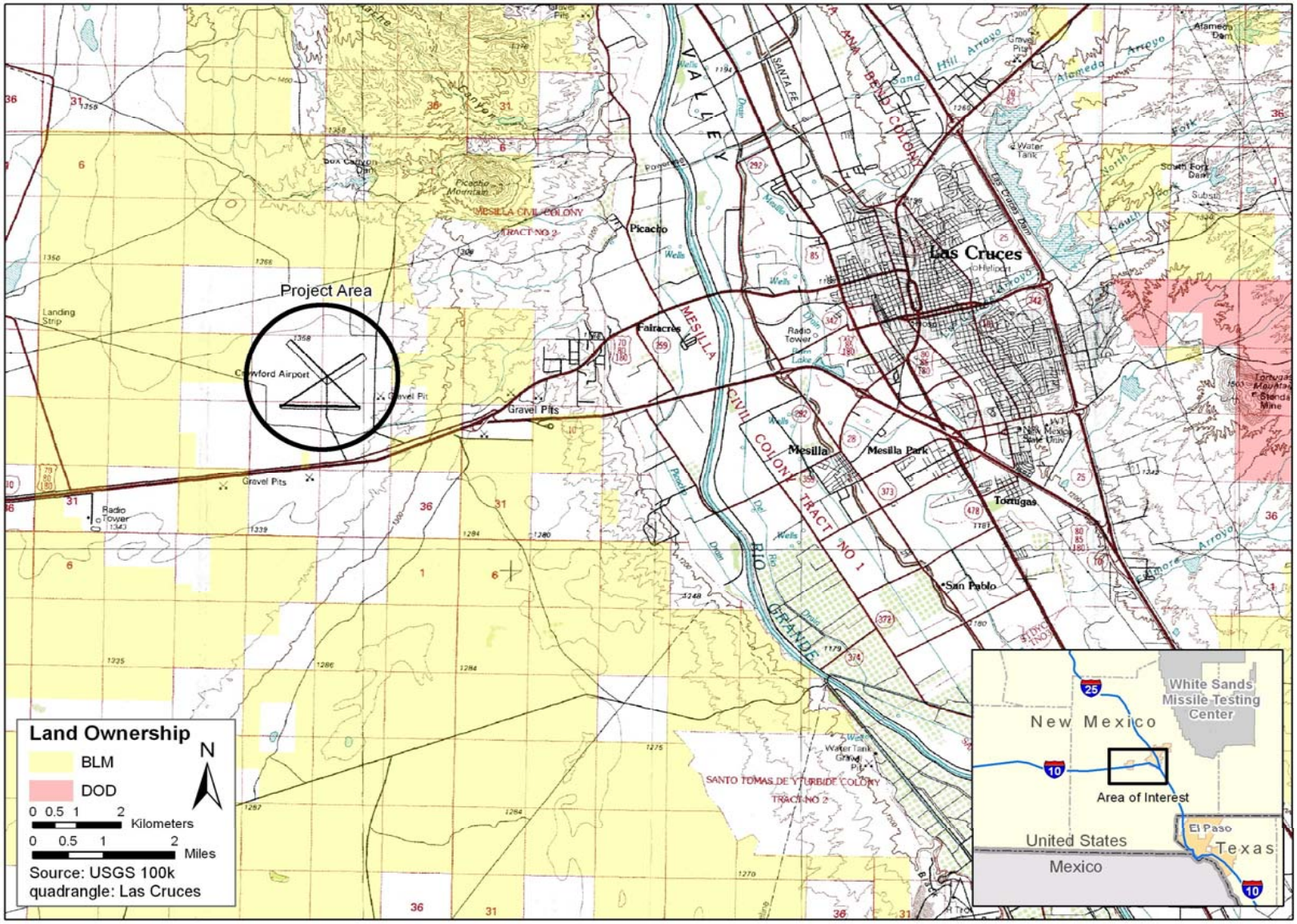

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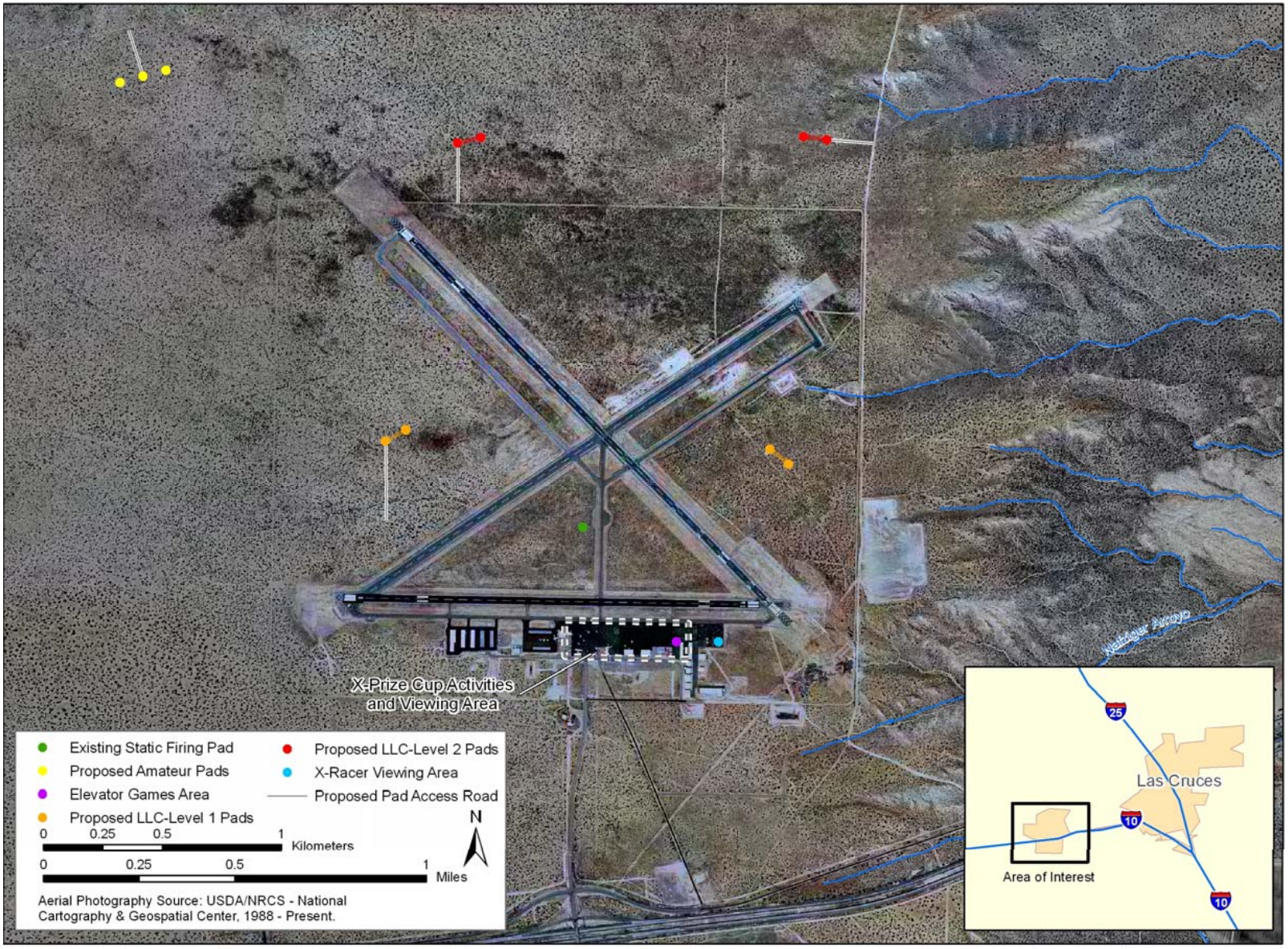

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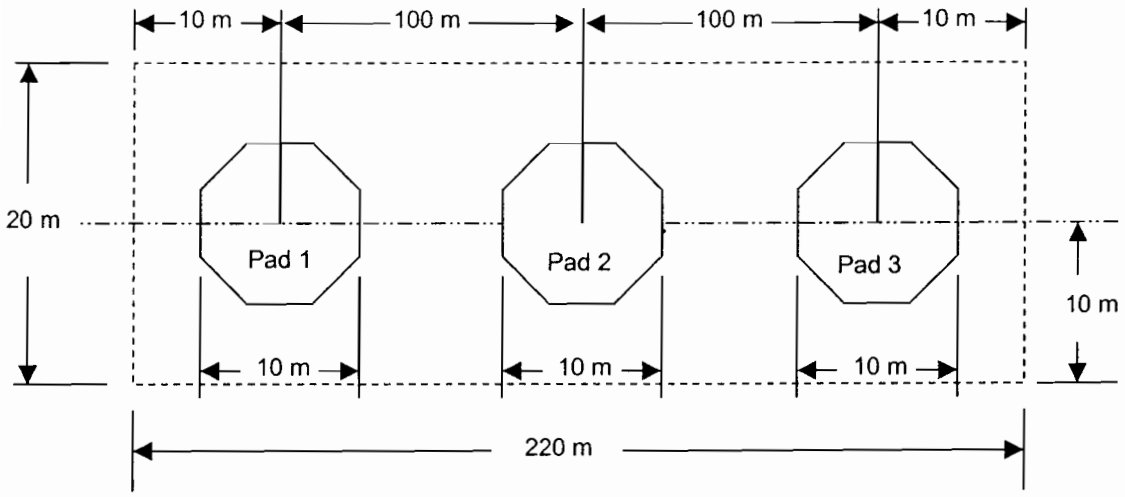

U.S. Department
of Transportation
**Federal Aviation
Administration**

Commercial Space Transportation
800 Independence Ave., SW.
Washington, DC 20591

JUL 10 2006

Ms. Katherine Slick
New Mexico State Historic Preservation Officer
Office of Cultural Affairs - Historic Preservation Division
228 East Palace Ave, Room 320
Santa Fe, NM 87501

Dear Ms. Slick:

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation is evaluating experimental permit applications of rocket developers proposing to launch reusable suborbital rockets for the X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge at the Las Cruces International Airport in Doña Ana County, New Mexico (see Enclosures 1 and 2). Launch and landing pads and access roads would be constructed to support the launches. The FAA would issue up to five experimental permits for the operation of 10 suborbital rockets. The Las Cruces International Airport will host the X Prize Cup from October 20 through 22, 2006. The FAA determined that the issuance of the experimental permits to the applicants of the Lunar Lander Challenge is subject to Section 106 of the National Historic Preservation Act (NHPA) and the National Environmental Policy Act (NEPA).

The FAA has conducted a preliminary search of available on-line sources including the New Mexico records, National Landmarks, and the National Register of Historic Places to identify historic properties and to determine whether all of the project area has previously been inventoried for historic properties. The FAA is aware that an intensive archaeological survey was conducted in 1998 concerning a proposed fence and maintenance road project at the Las Cruces International Airport. The survey results identified four archaeological sites that are eligible for listing in the National Register under Criterion D, and one site that would require additional testing to determine its eligibility for listing on the National Register.

The FAA has identified three federally recognized Indian tribes that may have information or concerns about historic properties in or near the project area and will be contacting them to ensure that the proposed action would not have an adverse impact on their interests. These tribes are the Fort Sill Apache Tribe of Oklahoma, the Mescalero Apache Tribe of the Mescalero Reservation, New Mexico, and the White Mountain Apache Tribe of the Fort Apache Reservation, Arizona.

Pursuant to 36 CFR 800.4(a)(ii), the FAA is requesting the views of the State Historic Preservation Officer on the proposed action as well as further actions to identify historic properties that may be affected by this undertaking, including information about Indian tribes and other organizations that may have information or concerns about historic properties in or near the project area.

The FAA is preparing an Environmental Assessment (EA) in accordance with NEPA to evaluate the potential environmental impacts associated with the issuance of up to five experimental permits. All the activities associated with the issuance of the experimental permits would occur within the Las Cruces International Airport property boundary and would include:

- Construction of nine 10-meter diameter (circular or octagonal) launch and landing pads (see Enclosure 3)
- Construction of three access roads
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In addition to the Lunar Lander Challenge, the X Prize Cup will feature a number of other activities including:

- X-Racer flights (a rocket powered airplane operating under an FAA Experimental Airworthiness Certificate) up to four times per day during the two-day X Prize Cup
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Unless otherwise noted, these activities do not require the issuance of permits or licenses by the FAA; therefore, FAA has no jurisdiction or authority to regulate such activities.

Please note that you will be provided with a copy of the Draft EA, upon completion, for review and comment. Thank you for your assistance in this matter. If you require further information to complete this request, please contact me directly at (202) 267-9305.

Sincerely,

Stacey M. Zee

Stacey M. Zee
Environmental Specialist, AST-100

Enclosures

cc: Jan V. Biella, Deputy State Historic Preservation Officer
Lisa M. Meyer, Planning and Compliance Program Manager

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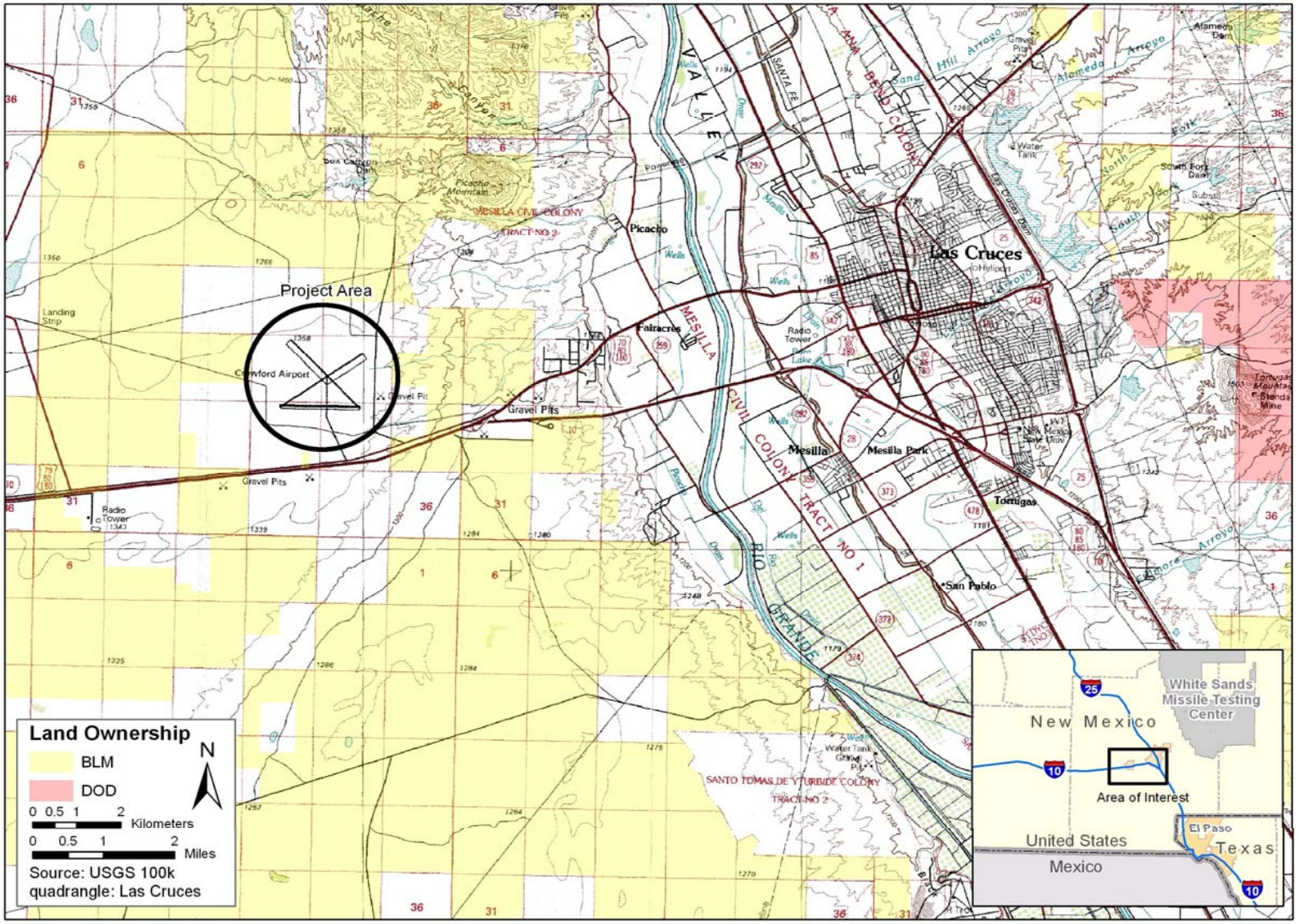

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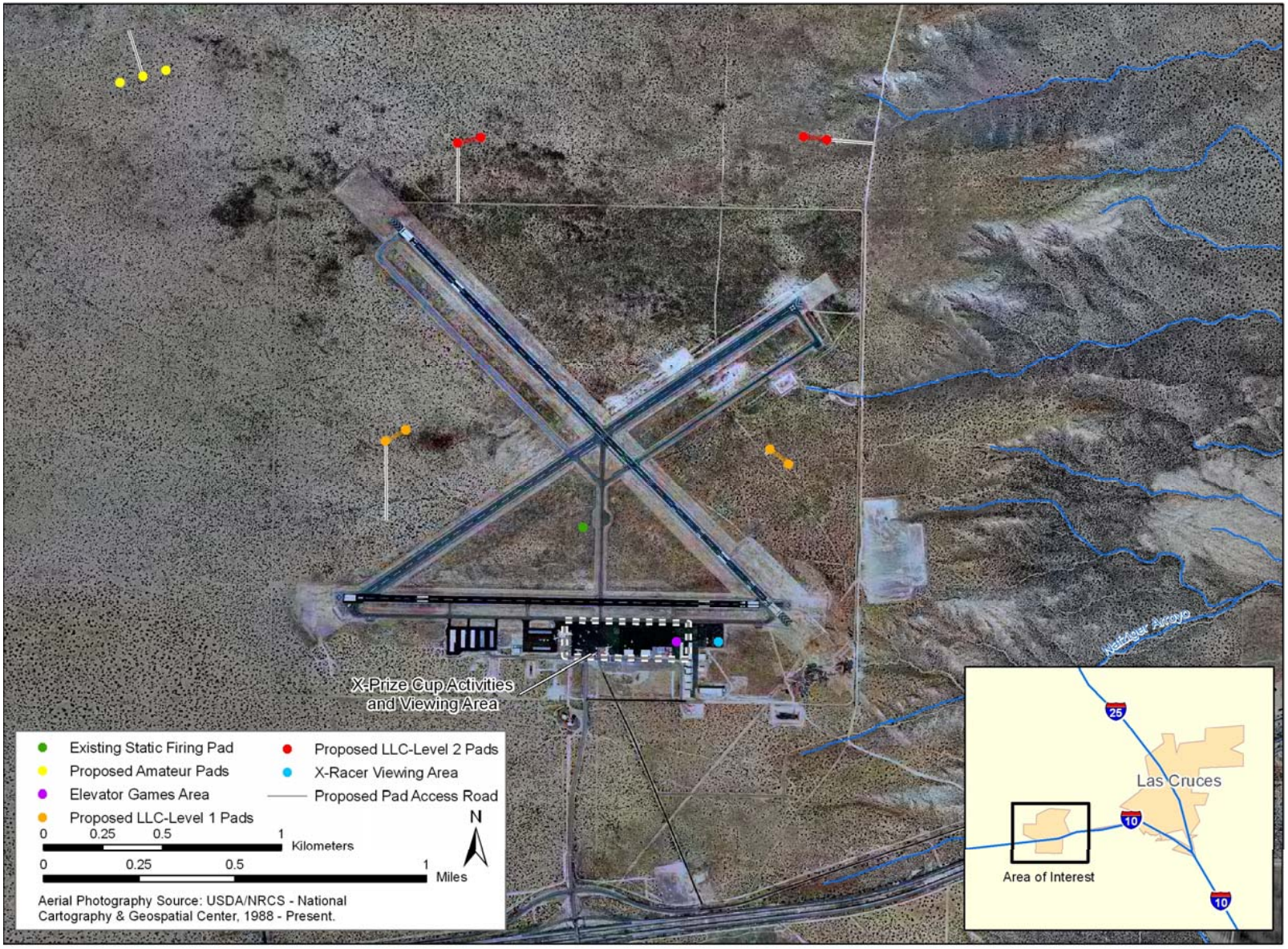

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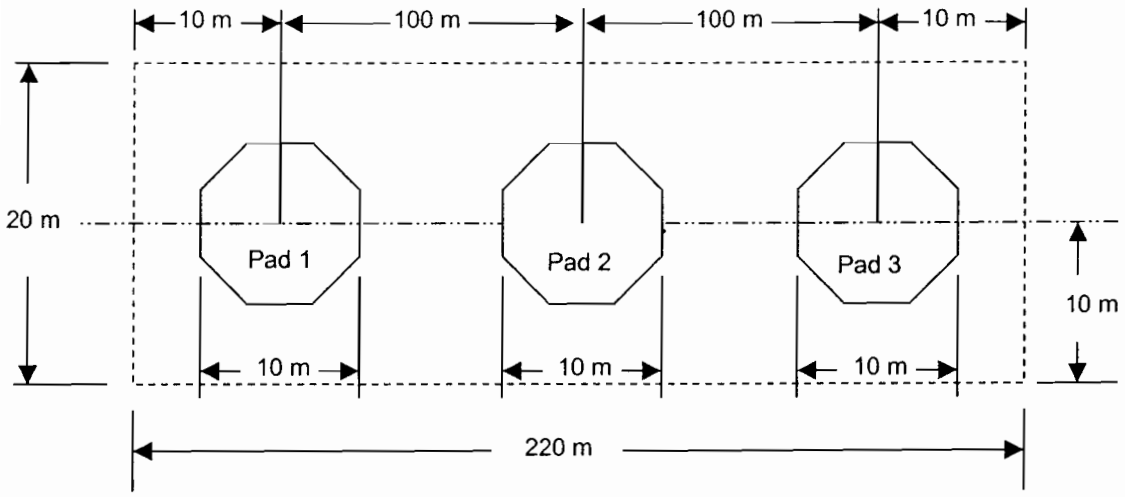

U.S. Department
of Transportation
**Federal Aviation
Administration**

Commercial Space Transportation
800 Independence Ave., SW.
Washington, DC 20591

JUL 10 2006

Mr. Luis Rios
Las Cruces Office, Supervisor
New Mexico Department of Game and Fish
2715 Northrise Drive
Las Cruces, NM 88011

Dear Mr. Rios:

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation is evaluating experimental permit applications of rocket developers proposing to launch reusable suborbital rockets for the X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge at the Las Cruces International Airport in Doña Ana County, New Mexico (see Enclosures 1, 2, and 3). Launch and landing pads and access roads would be constructed to support the launches. The FAA would issue up to five experimental permits for the operation of 10 suborbital rockets. The Las Cruces International Airport will host the X Prize Cup from October 20 through 22, 2006. FAA-AST has determined that the issuance of the experimental permits to the applicants of the Lunar Lander Challenge is subject to the New Mexico Wildlife Conservation Act and the National Environmental Policy Act (NEPA).

The FAA reviewed the U.S. Fish and Wildlife Service Endangered Species List available online at http://www.fws.gov/ifw2es/endangeredspecies/lists/ListSpecies.cfm and the New Mexico Department of Game and Fish (NMDGF), Biota Information System of New Mexico (BISON-M) available at http://nhnm.unm.edu/bisonm/bisonquery.php (see Enclosure 4). The FAA is requesting your comments and/or concurrence that the species presented in Enclosure 4 is the current list of federally and state listed species that occur in Doña Ana County, and that no designated critical habitat for these species is found within the proposed project area. In addition, the FAA is requesting reported occurrences of any federally or state listed species within one mile of the Las Cruces International Airport.

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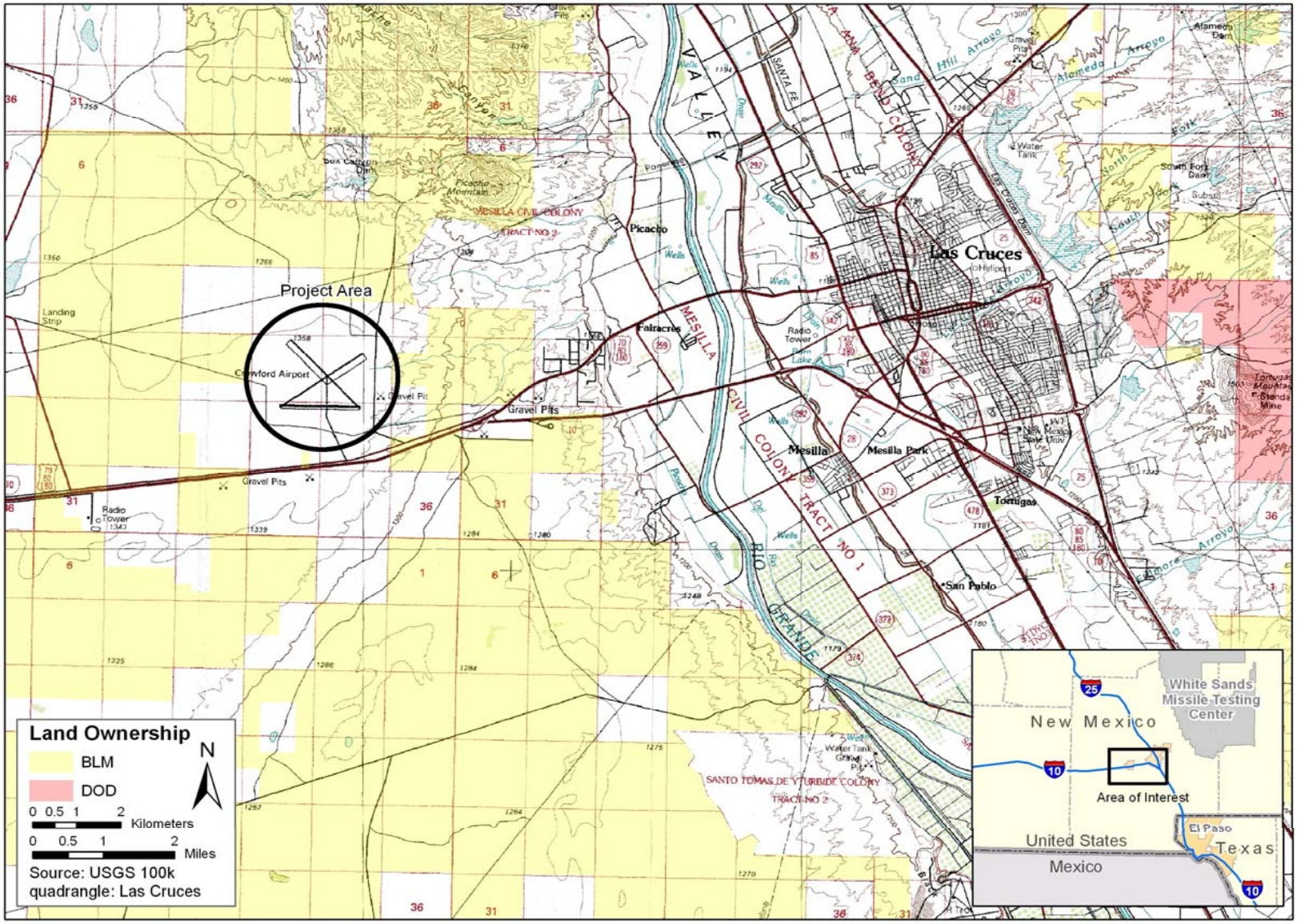

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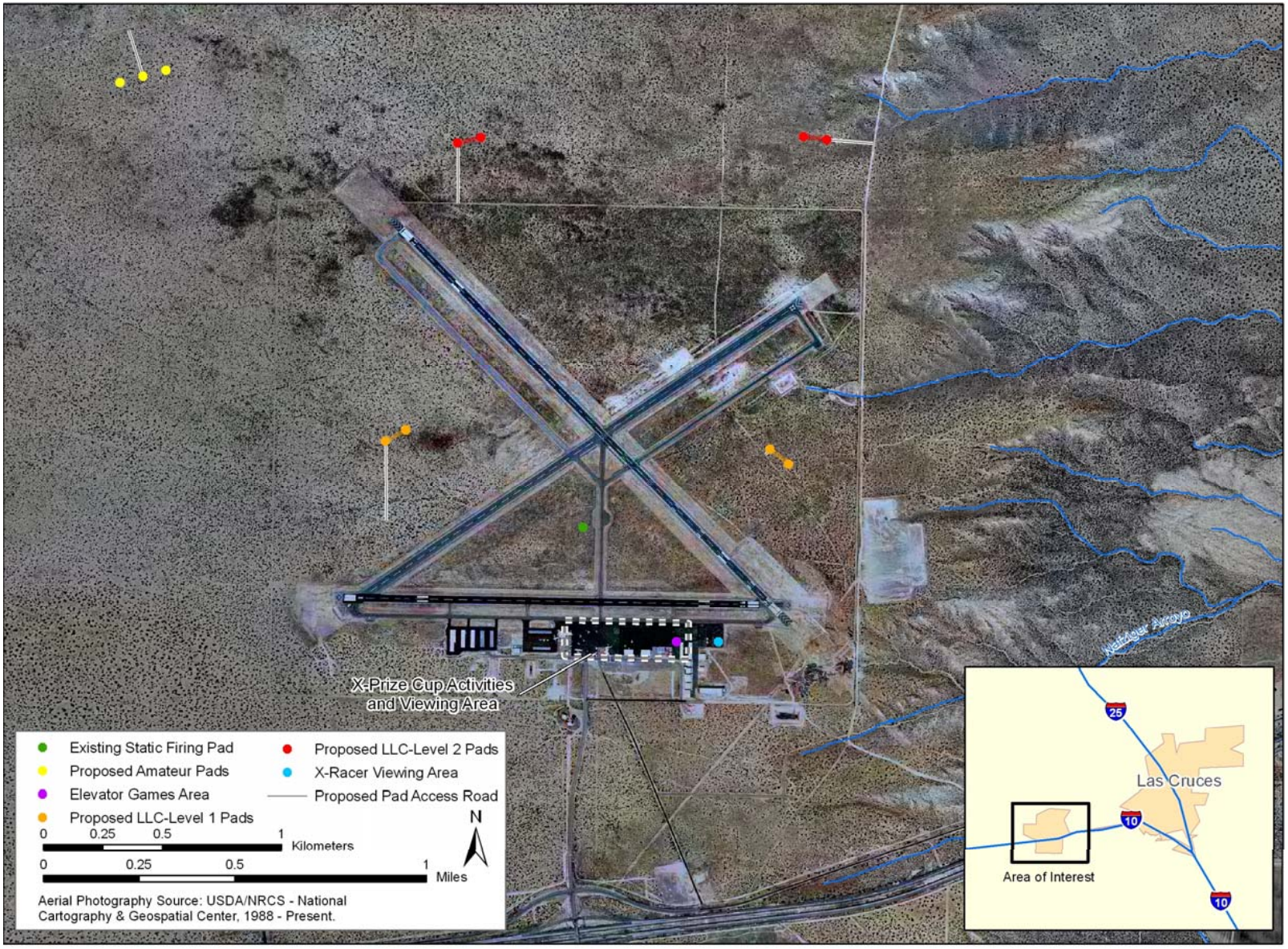

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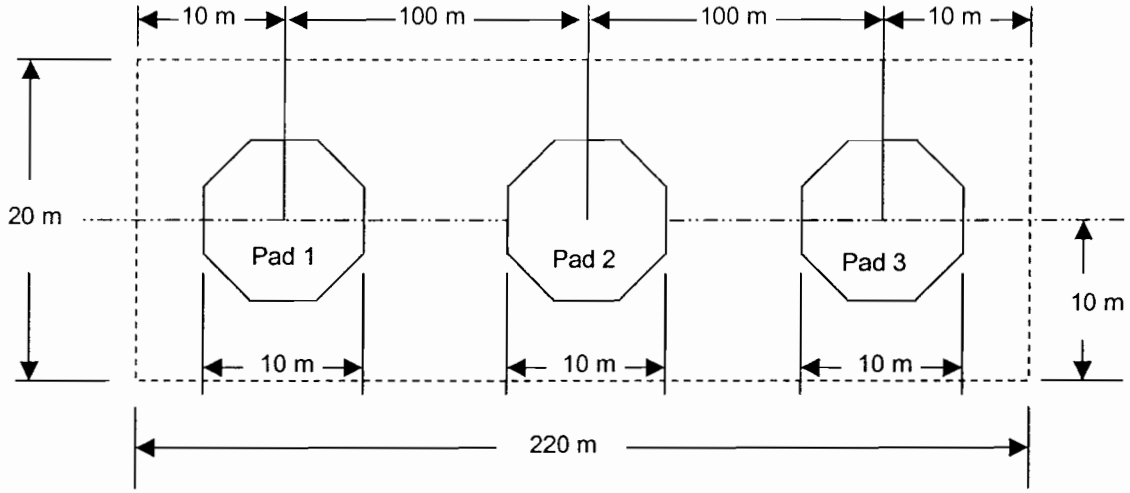

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Common ground dove	*Columbina passerina pallescens*	n/a	endangered
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Sources: Biota Information System of New Mexico, 2004; USFWS, 2006
n/a = not listed

U.S. Department
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JUL 10 2006

Las Cruces Service Center
USDA Natural Resources Conservation Service
2507 North Telshor Blvd.
Las Cruces, NM 88011

To Whom It May Concern:

The Federal Aviation Administration (FAA), Office of Commercial Space Transportation is evaluating experimental permit applications of rocket developers proposing to launch reusable suborbital rockets for the X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge at the Las Cruces International Airport in Doña Ana County, New Mexico (see Enclosures 1 and 2). Launch and landing pads and access roads would be constructed to support the launches. The FAA would issue up to five experimental permits for the operation of 10 suborbital rockets. The Las Cruces International Airport will host the X Prize Cup from October 20 through 22, 2006. FAA-AST has determined that the issuance of the experimental permits to the applicants of the Lunar Lander Challenge is subject to the Farmland Protection Policy Act (FPPA) and the National Environmental Policy Act (NEPA).

To determine the potential occurrence of prime farmland at the Las Cruces International Airport, the FAA reviewed the Web Soil Survey online application provided by the National Cooperative Soil Survey and the Natural Resources Conservation Service. According to the survey, the proposed construction sites contain soils classified as Bluepoint loamy sand, Bluepoint-Caliza-Yturbide complex, Cacique-Cruces association, and Tencee-Upton association. The FAA has determined that these soils are not considered unique or prime farmland as defined under the FPPA and is requesting your comments and/or concurrence with these determinations.

The FAA is preparing an Environmental Assessment (EA) in accordance with NEPA to evaluate the potential environmental impacts associated with the issuance of up to five experimental permits. All the activities associated with the issuance of the experimental permits would occur within the Las Cruces International Airport property boundary and would include:

- Construction of nine 10-meter diameter (circular or octagonal) launch and landing pads (see Enclosure 3)
- Construction of three access roads
    - Access roads for the eastern and western LLC/VTC zones would be short spurs off of the existing airport perimeter road
    - The access road for the northern LLC/VTC zone would run from the cross-area of the runways to the pads

- A week of static test firing and test flights (no more than five minutes of rocket engine operation per day)
- One day of suborbital rocket fights between the launch and landing pads (all flights would be less than four minutes in duration and less than 3,000 feet in altitude)

In addition to the Lunar Lander Challenge, the X Prize Cup will feature a number of other activities including:

- X-Racer flights (a rocket powered airplane operating under an FAA Experimental Airworthiness Certificate) up to four times per day during the two-day X Prize Cup
- Enlargement of the X-racer fueling pad from 400 square feet to 1,600 square feet
- Up to 1,000 Estes model rocket launches (https://www.estesrockets.com)
- Grading and clearing of three 10-meter (circular or octagonal) launch pads for amateur rocket launches
- Up to 12 launches of six amateur rockets from a temporary launch rail placed on an existing road, operating under FAA Part 101 airspace waivers
- Static firing of up to six rocket engines
- The Elevator Games (a cable tensile strength test and a remotely powered rope-climbing vehicle race)

Unless otherwise noted, these activities do not require the issuance of permits or licenses by the FAA; therefore, FAA has no jurisdiction or authority to regulate such activities.

Thank you for your assistance in this matter. If you require further information to complete this request, please contact me directly at (202) 267-9305.

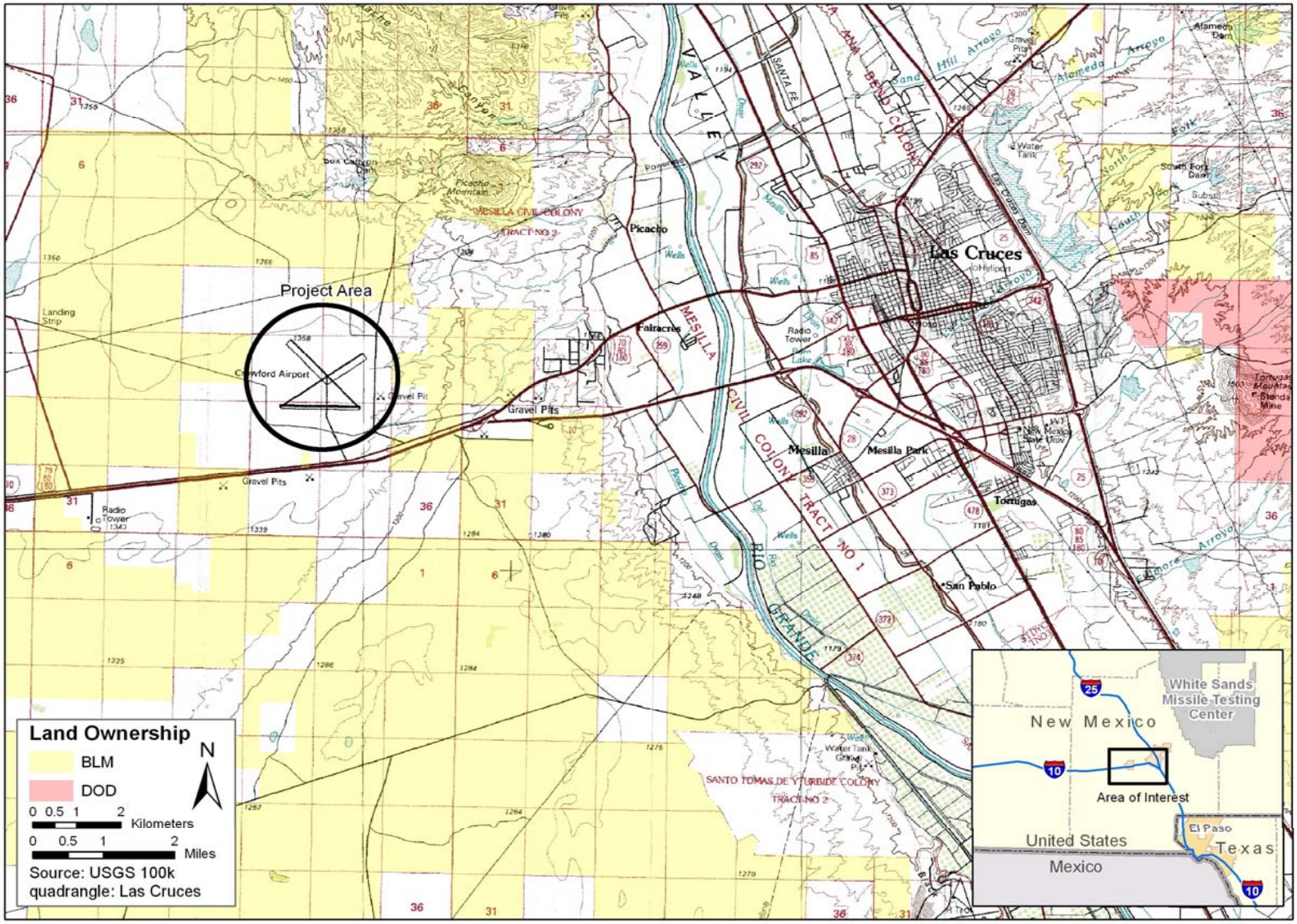
Sincerely,

Stacey M. Zee

Stacey M. Zee
Environmental Specialist, AST-100

Enclosures

Enclosure 1. Location of the Proposed Project Area, Las Cruces International Airport



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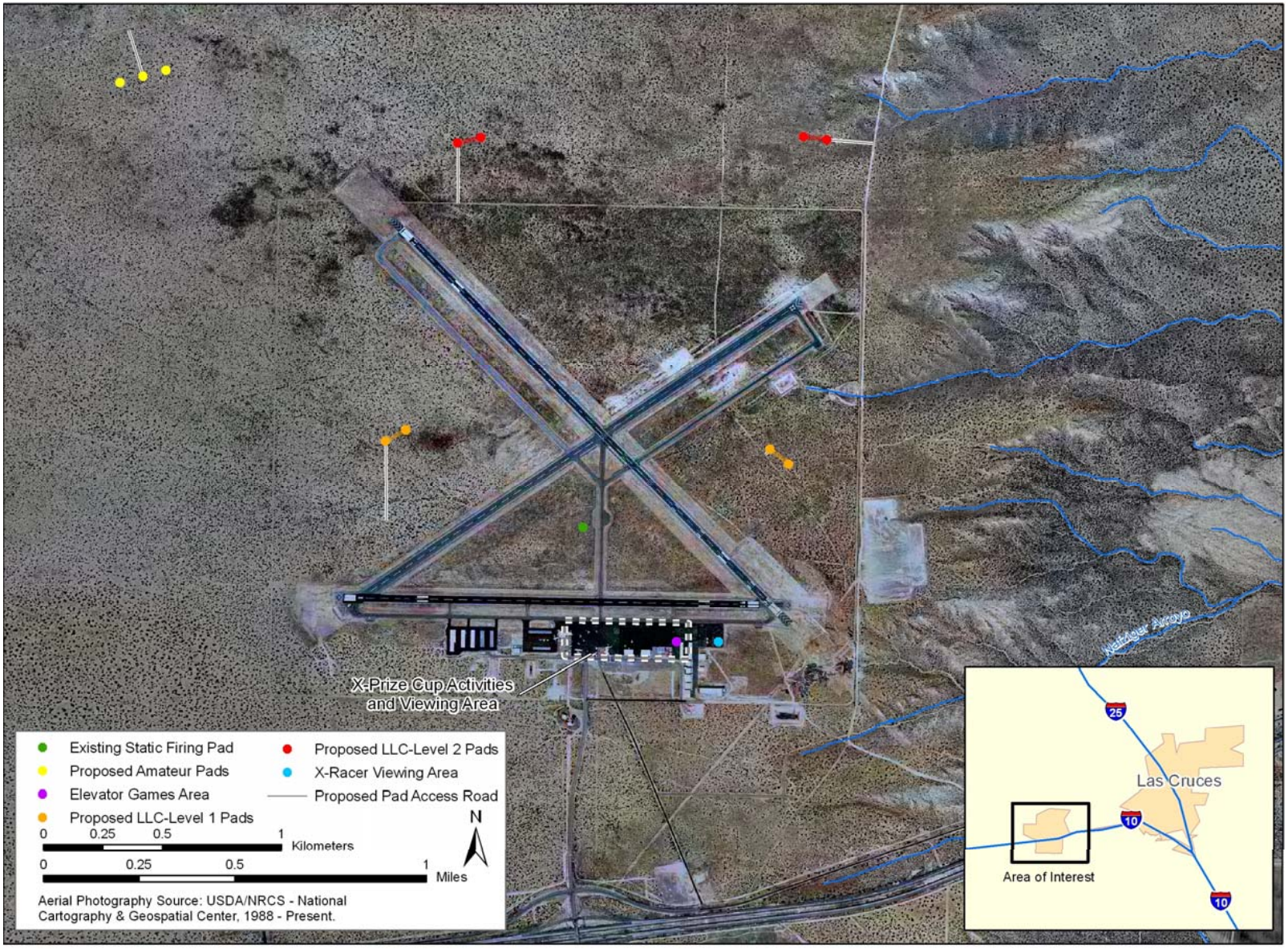
Enclosure 2. Layout of Proposed Construction at the Las Cruces International Airport



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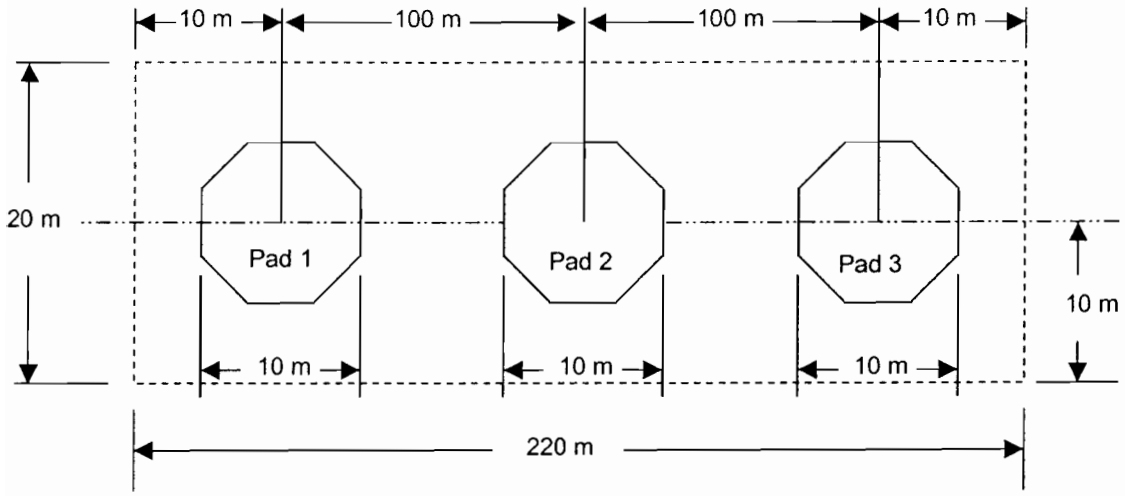
Enclosure 3. Proposed Pad and Operating Area Layout



July 31, 2006

Stacey M. Zee
Environmental Specialist, AST-100
Federal Aviation Administration,
Commercial Space Transportation
800 Independence Avenue SW
Washington, D.C. 20591

RE: Proposed Construction Related to X Prize Cup, Vertical Rocket Challenge and Lunar Lander Challenge, Las Cruces International Airport, New Mexico

Dear Ms. .Zee:

Thank you for your letter dated July 10, 2006 describing proposed construction for the X Prize Cup at the Las Cruces International Airport. We are providing comments in this letter regarding the potential impacts to possible cultural resources within the Area of Potential Effects (APE) and some additional information that may be useful to you in completing the National Environmental Policy Act (NEPA) compliance process.

Our database indicates that some, but by no means all, of the land on and near the Crawford (Las Cruces International) Airport has been surveyed for cultural resources. At least one archaeological site has been recorded near the end of one of the runways, and it has been determined eligible for the National Register of Historic Places (NRHP). Based on the fact that many other archaeological sites are known in the vicinity of the airport, it is likely that additional sites exist within the APE.

A cultural resource survey will be necessary to determine whether additional historic properties are present within the proposed construction and access areas. A survey should cover all construction areas, access points and access roads, all equipment staging areas, and any other areas that will experience direct or indirect physical impacts from proposed construction. A list of qualified permitted contractors for performing such survey is available from the New Mexico Historic Preservation Division (HPD) website, if you choose to use personnel outside your agency (http://www.nmhistoricpreservation.org). Persons conducting the survey should possess the relevant professional qualifications for archaeologists under the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and hold a current state permit.

Our website also contains a list of tribes that have interests in undertakings in the various counties; the list for Doña Ana County contains five tribes in addition to the three you have

indicated you will be contacting. We recommend that you expand your consultation to include these five additional tribes, unless they have explicitly declined consultation with the FAA for undertakings in Doña Ana County. You can access our list on the website cited above and go to "Forms and Documents", then to "Pueblo Governors and Tribal Officials".

We note that in the final paragraph of your letter you indicate you will send a draft EA to our office for review and comment. We infer from this that you wish to combine your Section 106 compliance with the NEPA process, as advocated by the federal government, to provide greater streamlining of the two procedures. If so, we applaud your attempt to simplify compliance, and would ask that the cultural resource documentation provided in the EA be of the same level of intensity and completeness that would ordinarily be provided in a Section 106 compliance report. If it is not your intention to combine NEPA with Section 106, then we will look forward to reviewing a separate cultural resources report for your undertaking when it is complete.

Thank you for providing the SHPO an opportunity to comment on this undertaking. Please call Rebecca Procter, the reviewer, at (505) 827-6315 if you have any questions.

Sincerely,

Lisa M. Meyer
Program Manager, Preservation Planning and Compliance
For the NM State Historic Preservation Officer
LMM/rsp

Log: 78552